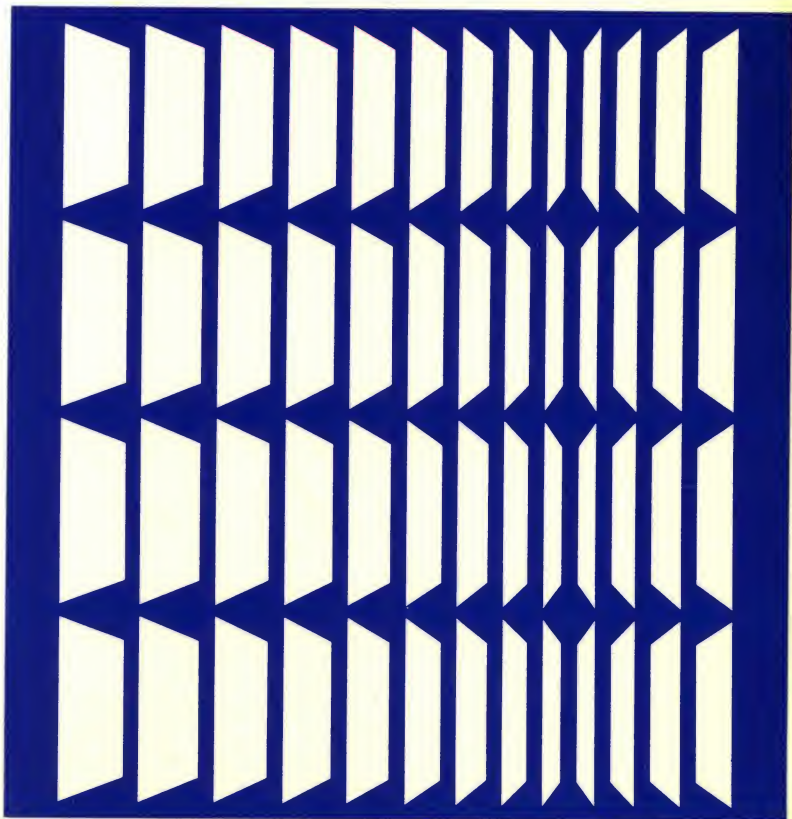


UNITED STATES GYPSUM

**5th edition
(revised)**

drywall construction handbook

price \$1.50



UNITED STATES GYPSUM COMPANY

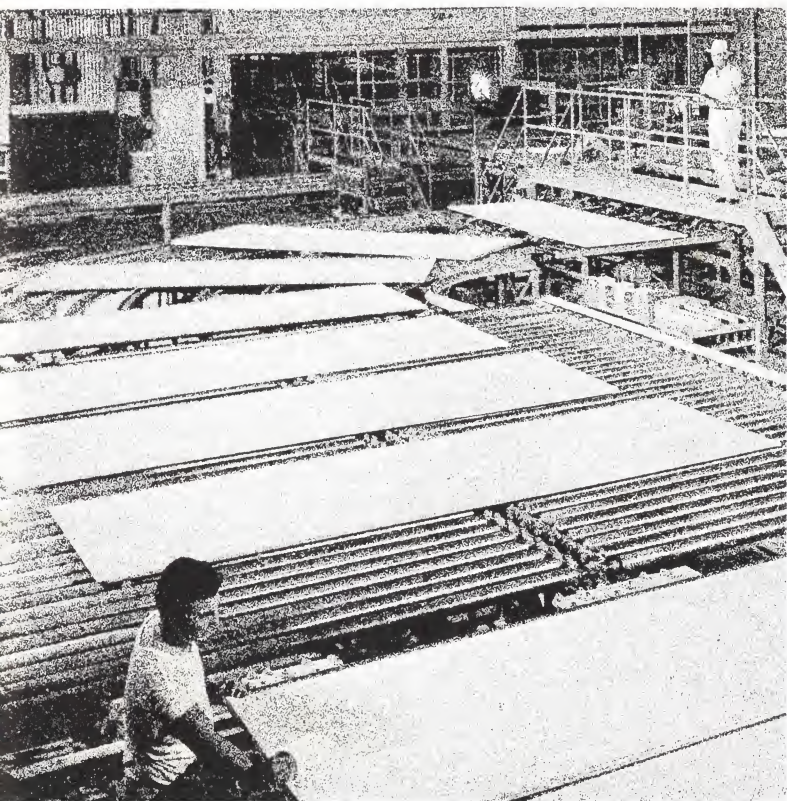
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gypsum drywall construction handbook

5th edition (revised)

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. . . ABOUT THIS HANDBOOK

This Handbook of Gypsum Drywall Construction presents complete data on products and systems developed to simplify and speed construction, enhance appearance, and increase the use of gypsum drywall construction. It contains new data on partition, ceiling and fireproofing systems, and revised up-to-date information on tools, products, methods of installation and good construction practices. It is a complete and authoritative guide, valuable for both those with limited knowledge and those with broad experience in gypsum drywall construction.

HOW IT SERVES YOU

This handbook will serve as a quick and comprehensive reference for any drywall information you want:

Architects and Builders—Complete information on drywall systems, including descriptions, advantages, limitations and detail drawings.

Contractors and Dealers—Full data on all aspects of drywall products, tools, methods, including estimating and planning.

Applicators, experienced or beginners—Clear, concise illustrated instructions on all phases of drywall application from framing to finish.

Building Inspectors and Code Officials—Fire and sound test data; proper construction procedures for products which must be used together to meet fire and sound rating requirements.

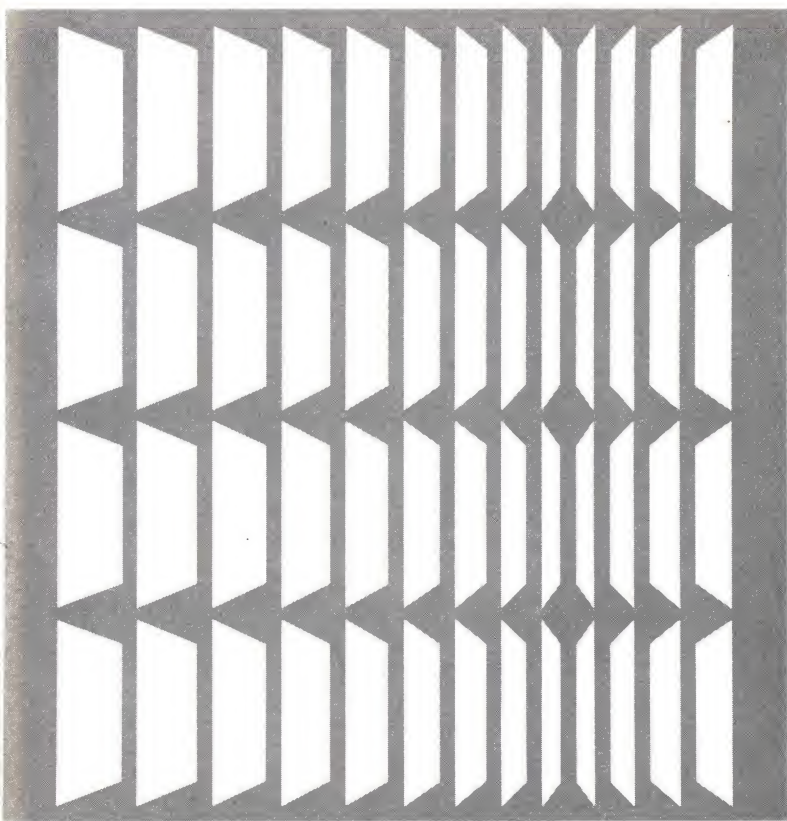
TO FIND THE INFORMATION YOU WANT:

Use the fully cross-referenced index at the back. Or—check Table of Contents on page 5 to find the applicable chapter, then use the detailed table on the first page of that chapter to find the right page.

For example, if you want information on metal trim, it's in the index both as "Metal trim" and "Trim, metal." Also, the facing Table of Contents shows "Products" as Chapter 2 and the table of contents at the start of the chapter shows the page where metal accessories are found.

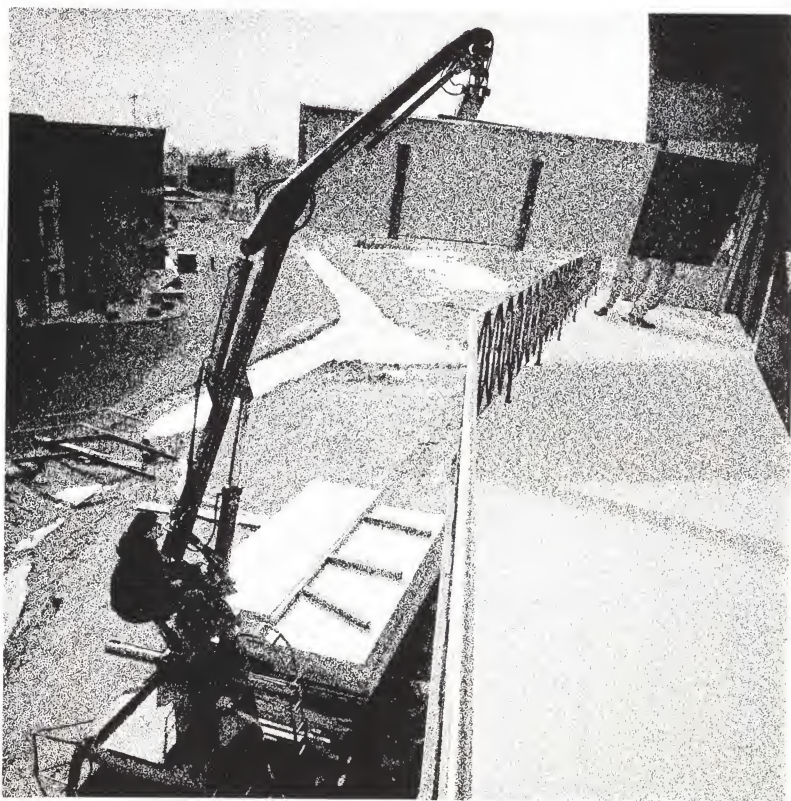
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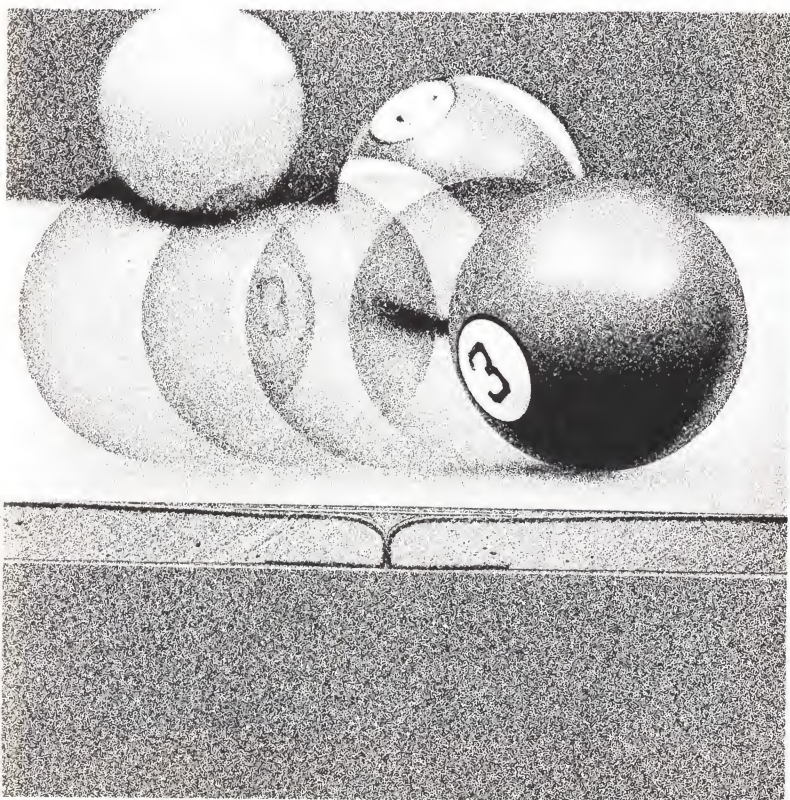


chapter 1

characteristics and practices



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THE DRYWALL REVOLUTION

In the last two decades, gypsum drywall construction has revolutionized the building industry. A dynamic expansion is taking place—to the point that today more than 75% of all new residential buildings have sturdy, beautiful walls and ceilings of fire-resistant gypsum wallboard.

Within the last ten years, through leadership in research and development, United States Gypsum has introduced many new products and systems for drywall construction. These systems offer specialized sound control and fire resistance together with speed of installation, strength and low cost. Their wide acceptance in commercial, industrial and institutional construction follows the pattern of drywall's dominance in residential work.

The key product in this revolution is SHEETROCK Wallboard, the first and most widely used brand of gypsum wallboard. It is available with the scientifically developed eased-edge configuration of SHEETROCK SW—designed to resist joint ridging and cracking—as well as in various types of board to meet every wall and ceiling requirement.

SHEETROCK SW Wallboard, after extensive testing under supervision of an impartial engineering firm, has been certified superior at resisting ridging. SHEETROCK SW joint assemblies showed far greater flatness and strength than assemblies using ordinary tapered-edge wallboard.

SHEETROCK has its beginning in the ground as a gray to white-colored rock called gypsum. The basic ingredient of fireproof wallboards, gypsum is a non-metallic mineral composed of calcium sulphate chemically combined with water of crystallization. This "dry" water makes up approximately 20% of the weight of gypsum rock. It is this feature which gives gypsum its fire-resistive qualities and makes it so adaptable to the manufacture of wallboard.

After gypsum ore is mined or quarried (illustrated, page 2), it is crushed, dried, ground to flour fineness, and heated or calcined to drive off the greater part of the chemically combined water as steam. This calcined gypsum, or plaster of Paris, is then mixed with water and other ingredients and sandwiched between two sheets of specially treated paper to form a ribbon of SHEETROCK, as illustrated on page 3. After the gypsum core has set, the wallboard is cut to length, dried, pre-finished as required and packaged for shipment. The entire process is conducted in strict accordance with specifications to meet carefully controlled high quality standards.

Success and continued expansion in gypsum drywall construction depends on keeping standards of quality and appearance high while cutting construction time and costs to a minimum. U.S.G. has consistently been in the forefront of this effort, providing new materials to increase utility and lower cost; new systems with improved fire resistance and sound control; advisory services to promote better materials handling, market analysis and business management; specification and application information as a guide to good construction practices.

advantages of gypsum drywall construction

Fire Resistant—Gypsum will not support combustion. Gypsum when exposed to fire behaves like a cake of ice when the flame from a blow torch is applied. The ice melts on the surface in contact with the flame while the opposite side remains cool. Similarly, the surface of gypsum wallboard opposite the flame remains at a relatively low temperature until the gypsum core is completely calcined.

Smooth Unbroken Surfaces—Now the new SHEETROCK SW System provides walls and ceilings of flawless beauty with the strongest joint ever developed. A U.S.G. Joint System reinforces and conceals the joints between panels.

Decoration—The strong, highly calendered face paper on SHEETROCK Wallboard is suitable for any type of decorative treatment such as paint, texture or wallpaper and permits repeated redecoration during the life of the building.

Pre-finished panels are available which require no painting or joint finishing. Walls are complete as soon as panels are installed. These fire-resistant panels have a durable finish that is easily maintained.

Minimum Moisture—SHEETROCK Gypsum Wallboard eliminates the use of tons of water on the job. Since excess moisture is not put into the building, the possibility of moisture damage is minimized.

Crack Resistance—The new SHEETROCK SW measurably reduces joint imperfections due to extremes in temperature and humidity. Bonded together with a U.S.G. Joint System, SHEETROCK panels form walls and ceilings that are exceptionally resistant to cracks caused by minor structural movement, vibrations or settlement.

Uniform Quality—SHEETROCK Gypsum Wallboard panels are factory-made products. The raw materials and the manufacture are carefully controlled.

Speed of Erection—The use of SHEETROCK Gypsum Wallboard permits earlier completion of construction—and earlier building occupancy.

Snug-Fitting Trim—The uniform thickness of each panel permits installation of wood or metal trim snug to wall surfaces.

Warp-Resistance—Expansion or contraction of SHEETROCK under normal temperature and humidity changes and resulting deformation are negligible.

good construction practices

Two ingredients are required for a *quality drywall job*—quality products and skilled craftsmen correctly employing good construction practices. SHEETROCK Gypsum Wallboard, a U.S.G. Joint System and drywall accessories are top quality products designed to *work together*, job-proven and constantly improved. But without proper planning and correct installation by the applicator, the products by themselves cannot be expected to produce the desired quality results.

This section deals with the basic job practices, design and installation recommendations that should be followed in planning and completing the best possible job. These good construction practices can give the applicator greater profit through fewer callbacks, less waste and lower job costs, and quality results that produce quicker sales, higher prestige and an enduring business reputation.

job practices

framing requirements

The framing that will receive SHEETROCK Wallboard should be thoroughly inspected to be certain that all previous work has been completed in good order. Good framing, particularly wood, is essential regardless of the type of wall surfacing materials used.

Wood framing should meet the requirements outlined in Chapter 3—Installation Methods and the minimum requirements of FHA, ALSC and local building codes.

Failure to observe these requirements will materially increase the possibility of fastener failure due to wood shrinkage and warping.

Framing should approach as closely as possible the moisture content it will reach in service by allowing the building, after it is enclosed, to stand as long as possible prior to application of the gypsum wallboard.

Framing should be designed to account for shrinkage in wide dimensional lumber such as floor joists and headers. Wallboard surfaces may buckle or crack when firmly anchored across the flat grain of wide wood members as shrinkage occurs. With high exposed walls and cathedral type ceilings, regular or modified balloon framing should be used. With western or platform framing, the wallboard must either be floated over the wood member or provided with a control joint at the joist location.

FRAMING CORRECTIONS

If joists are out of alignment, 2"x6" leveling plates attached perpendicular to and across top of ceiling joists may be used.

Toe nailing into joists pulls framing into true horizontal alignment and insures a smooth level ceiling construction.

Bowed or warped studs may be straightened by sawing the hollow sides at the middle of the bow and driving a wedge into the saw kerf until the stud is in line. Reinforcement of the stud is accomplished by securely nailing 1"x4" wood strips or "scabs" on each side of the cut (see photo).



job storage

If possible, SHEETROCK Wallboard should be ordered for delivery a day in advance of drywall application. Materials stored on the job for a long period of time are subject to excessive abuse. Wallboard, like millwork, is a finish material to be handled with care to avoid damage.

The SHEETROCK should be placed inside under cover and stacked flat on a clean floor in the centers of the largest rooms. It is often desirable to place the necessary number of pieces of SHEETROCK Wallboard in the location where they will be used. All materials used on the job should remain in their wrappings or containers until ready for actual use.

SHEETROCK planned for use on ceilings should be placed on top of pile for removal first. Avoid stacking long lengths on short lengths, as the weight of overhang of the longer board is apt to break the boards.

If flat storage space is not available an alternate method of short-term, on-the-job storage is placing the wallboard vertically against the framing with the long edge of the board horizontal. This method should not be used for long periods since vertical storage may deform the board. With this type of storage, some jobs cannot be stocked until electrical and plumbing installations are made.

Caution should be exercised not to overload the framing members acting as a brace for this manner of storage, and not to overload floor space in a storage area when board is piled flat. There are so many variable conditions that, in general, outside storage of SHEETROCK Wallboard is not recommended.

mechanical handling

When drywall construction moved into high-rise buildings, it brought with it the new challenge of moving large wallboard panels from the ground to the point of use many stories up. Materials handling on the job site can add cost and whittle away profit while the contractor scarcely knows where his money has gone. Time and money savings can be substantial when correct handling procedures are used. Job conditions vary so widely that it is impossible to establish universal materials handling procedures. However, there is much to be learned from inspecting methods used in various job situations and from reviewing resulting costs.

Case studies with photos and step-by-step procedures of material handling methods used by contractors around the country are available. Contact your U.S.G. representative for help in



determining on-site handling costs and methods best suited to particular job conditions. Also see Chapter 7—Tools—for descriptions of handling equipment and available suppliers.

temperature and humidity conditions

In cold weather (outdoor temperatures less than 55° F.), controlled heat in the range of 55° to 70° F. must be provided. This heat must be maintained both day and night 24 hours before, during and after entire gypsum wallboard and joint treatment application and until permanent heating system is in operation or the building is occupied. Ventilation should be provided to eliminate excessive moisture. In glazed buildings, this may be accomplished by keeping windows open approximately 2" top and bottom (or side-pivoted windows approximately 4") to provide air circulation. In enclosed areas lacking in natural ventilation, temporary circulators should be used. Under slow drying condi-

tions, allow additional drying time between coats of joint compound. Avoid drafts during hot, dry weather to prevent too rapid drying of joint compound. Also see "Cold Weather Tips—Joint System Application," Chapter 3.

design recommendations

perimeter isolation and control joints

Drywall partitions, ceilings, column fireproofing and furring will not resist stresses imposed by structural movement, and are subject to dimensional variations due to changes in temperature and humidity. It is recommended that wallboard surfaces be isolated from all structural elements, except the floor, by control joints or other means where:

- a. a wallboard surface abuts any structural element or dissimilar wall or ceiling assembly.
- b. the construction changes within the plane of the partition, ceiling, furring or fireproofing.
- c. the basic interior or exterior wall contains a control or expansion joint.

In long partition and wall furring runs, control joints should be provided no more than 30' o.c. Door frames extending from floor to ceiling are recommended as control joints. For doors less than ceiling height, control joints extending from both corners of the frame to the ceiling may be used.

Expansive ceiling areas should have control joints spaced not to exceed 50' in either direction. The continuity of wallboard and supports should be broken over control joints. Control joints may be positioned to intersect light fixtures, heating vents, air diffusers, etc., which are usually considered weak spots.

Exterior portland cement-lime stucco surfaces in the Metal Stud Curtain Wall System should be divided into panels with control joints spaced no more than 10' o.c. in either direction (30' o.c. for inside surface as shown above). The area of a separate section should not exceed 100 sq. ft. Sheathing and interior lath or wallboard should be broken behind control joints. Where vertical and horizontal joints intersect, the vertical joint should be continuous and the horizontal joint should abut it. Splices, terminals and intersections should be caulked with USG Acoustical Sealant.

See Chapter 3 for correct installation procedures for control joints and perimeter isolation.

vapor control

Condensation of moisture from the air occurs when the temperature of warm moist air is reduced and the cooler air is unable to hold as much water vapor. Condensation in exterior walls is a

common cause of paint failure, warped siding and rotted studs and sills. Also, moisture penetration can reduce the effectiveness of wall and ceiling insulation. An efficient vapor barrier installed in walls and ceilings usually prevents this damage and is particularly important in climates with wide summer-winter temperature fluctuations—also in humid mild climates.

United States Gypsum has developed a number of products and systems designed to reduce moisture penetration and also provide significant insulating values. The outstanding resistance to vapor penetration of the bright aluminum foil laminated to the back of Insulating SHEETROCK Wallboard makes it an ideal material for condensation control, especially when installed with effective insulating materials.

The strong asphalt paper covering THERMAFIBER Regular Insulating Blankets and the aluminum foil encasing THERMAFIBER Silver Shield Blankets provide excellent vapor barriers. Polyethylene plastic film at least 4 mils thick is also satisfactory.

A vapor barrier should be located on the warm side of exterior walls and top floor ceilings to prevent moisture penetration into the construction. Care should be taken when erecting wallboard to see that the foil backing or other vapor barrier is not punctured or destroyed. When two vapor barriers occur in close proximity or within the same construction, such as in attics, crawl spaces or metal curtain wall construction, the space between the barriers should be vented to remove moisture which has penetrated the warm barrier.

insulation

Quality drywall construction today demands proper insulation of exterior wall surfaces, beams and columns to minimize the possibilities of partitions cracking and to reduce shadowing and spotting problems in exterior walls.

Steel and concrete beams and columns expand as temperatures rise and contract as temperatures drop. For example, a 50' length of concrete expands $\frac{3}{8}$ " in length as the temperature varies from -10°F to 90°F . These movements are transferred to the partitions which are indirectly attached to or supported by the framing. Exterior structural members should be properly insulated in addition to employing appropriate isolation and control joints to reduce the amount of expansion and contraction and the possibilities for partition cracking. See Chapter 6—Cracking Problems in High-Rise Structures for a full description of this condition.

Shadowing and spotting due to airborne dirt accumulation over screw heads is a potential problem whenever an exterior curtain wall or wall furring system is used. Photographing or shadowing over the furring members or studs resulting from dirt or smoke deposition may also occur, although less frequently. The problem is caused by a differential in temperature between the metal screws, metal studs or furring members and the surrounding wallboard surface during periods of low temperature. This results in

a greater accumulation of dirt over screw heads and framing members than on the surrounding surface of wallboard. The intensity of the spotting or shadowing will vary directly with the temperature differential as well as with the amount of airborne dirt or smoke.

Because of the temperature and airborne dirt conditions over which United States Gypsum has no control, the Company cannot be held responsible for the surface blemishes that may result.

Where temperature, humidity and soiling conditions are expected to cause objectionable shadowing and spotting, one of the following alternates should be considered:

a. Additional insulation should be provided to reduce the temperature differential between the metal components and the surrounding wallboard.

b. For maximum resistance to shadowing and spotting, a separate chase wall construction is recommended. The interior wall surface should be separately framed with free-standing furring that is independent of the exterior walls.

The All-Weather Standards of the National Mineral Wool Association shown below give minimum insulation requirements for air-conditioned or electric-heated buildings.

All-Weather Standards—Wool Insulation

Building Section	Select Blankets Marked This Way	Installation Recommendations
Ceilings— Extreme Temp. Areas	R-24	With min. 1" air space between vapor barrier & ceiling
Ceilings— Moderate Temp. Areas	R-19	With min. 1" air space between vapor barrier & ceiling
Walls	R-11	Can substitute R-13 in extreme temperature areas
Floors	R-13	With min. 1" air space between vapor barrier & floor

NOTES: Ratings shown apply to floors over unheated spaces. Recommendations are subject to variation due to individual type of construction, amount and orientation of window area, sheltered location, capacity of heating and cooling equipment, etc.

In accordance with industry standards, THERMAFIBER Insulation products are labeled with each product's mass resistance (of insulation only), thickness and installed resistance. This installed resistance is the sum of mass resistance and resistance of adjacent air spaces or air surfaces which may exist. All manufacturers' mineral wool insulation products marked with the same Installed Resistance Number have the same insulation value regardless of individual thickness.

sound control

The partitions, floors and ceilings of a building provide resistance to transmission of airborne and structure-borne sound. Their efficiency as sound barriers is dependent upon several factors that concern drywall construction:

1. **Mass**—The heavier the construction, the greater its resistance to sound transmission.
2. **Isolation**—The separation of opposite surfaces of a construction will improve sound isolation. Surfaces may be separately supported with no structural connections between them or may be resiliently mounted to common supports.
3. **Damping**—The addition of sound attenuation wool within the construction effectively dissipates sound energy by converting it to heat.
4. **Leaks**—Cracks, penetrations or any openings, however small, readily conduct airborne sound.
5. **Flanking Paths**—Sound is transmitted along the path of least resistance which is usually through the structure and around sound barrier walls and floor-ceilings.

GUIDELINES FOR SOUND-CONTROL CONSTRUCTION

1. Wall and ceiling construction should provide approximately the same degree of sound control through each assembly. Where a drywall partition is used for sound isolation, the construction should extend from slab to slab. Sound can travel through a suspended acoustical ceiling, up and over a partition attached to a suspended ceiling and into other areas.
2. Doubling the mass (weight) of a partition improves sound attenuation by about 5 decibels (db).
3. Doubling the width of air space between free-standing partition diaphragms improves sound attenuation by about 5 db.
4. Do not substitute materials in a sound control system as this may reduce the attenuation performance.
5. THERMAFIBER Sound Attenuation Blankets placed in the partition cavity greatly improve the performance only if the system is resilient, as with RC-1 Channels or metal studs.
6. For effective sound control, an assembly must be airtight—perimeters and all penetrations must be sealed with acoustical caulk such as USG Acoustical Sealant. Enough sound can leak through a 1-sq. in. hole in a 100-sq. ft. partition to lower the performance approximately 10 STC points.
7. Electrical outlet boxes and similar penetrations such as heat outlets on opposite sides of a sound control partition should be separated by at least one stud space and should not be directly connected. Caulk the back and sides of electrical boxes and the perimeter of all penetrations.

8. Back-to-back bathtubs and recessed medicine cabinets can reduce sound control performance. Provide a wall surface between bathtubs and use surface-mounted cabinets.
9. Hollow-core doors are ineffective in retarding the transmission of sound between rooms. If required in sound walls, doors should have solid cores and seals at the perimeters.
10. Continuous ceilings over sound control partitions provide a flanking path for sound. Install expansion joints in the ceiling at intersection with partitions to decouple ceiling areas. With an open plenum, retard flanking with THERMAFIBER Blankets laid directly on the ceiling and extending 4 to 5 ft. out from the partition.
11. Conduit, recessed light fixtures, heat ducts and other services rigidly secured to a resiliently attached diaphragm will negate its sound-isolating property by "short circuiting" the decoupling.
12. Air chambers at plumbing valves and individual waste stacks for separate apartments will alleviate much irritating plumbing noise.
13. Noise-producing appliances and fixtures (dishwashers, garbage disposals, water closets, exhaust and furnace blowers) should be isolated from the structure with resilient mounts and flexible service leads.

fire resistance

Building codes establish fire endurance requirements for various building elements that provide an acceptable level of safety to life and property. A fire resistance rating denotes the length of time a given partition, floor-ceiling or column assembly can resist passage of intense heat and flames, while supporting the imposed design loads.

Fire ratings are based on specific components and details of assembly and not on the ceiling or partition membrane alone. Products used in fire-rated assemblies are regularly tested for uniformity and compliance and are specifically listed in systems specifications and labeled for easy recognition by field inspectors.

Construction of fire-rated assemblies should be preceded by carefully reading the test report for specific details of assembly. If this construction is not followed, changes may adversely affect the result. Any deviation in construction or substitution of materials from those described in the test report, therefore, should be carefully considered in advance.

Construction to meet certain fire requirements will vary with the type of building. The hazards in an apartment building will obviously be different—and more complex—than in a single-family unit. It is important that the building code be studied to determine specific requirements; then suitable fire-rated assemblies and necessary construction details may be selected.

18 good practices/wallboard application

These are some important fire-resistance details for apartment construction:

- Where pipes, wires, ducts, utility lines, etc. pass through floors or vertical shafts, caulk holes to reduce draft or path for flame.
- Carry flooring and sub-flooring to walls. Caulk all openings that remain.
- Cover entire area behind tubs, sinks, cabinets, soffits, etc. with wallboard so that there are no openings in the wall surface. Build soffits and position cabinets and plumbing fixtures over the unbroken surface. Place heating ducts outside framing and enclose with furring and gypsum wallboard.

installation recommendations

general recommendations for applying SHEETROCK wallboard

Application—The following recommendations are for SHEETROCK wallboard applied to wood and metal framing:

- Ceiling panels should be installed first.
- SHEETROCK Wallboard panels should be cut so as to slip easily into place.
- All joints should be loosely butted together. Boards should never be forced into position.
- Tapered edges, except at angles, should always be placed next to one another.
- Butt ends should never be placed next to a tapered edge. (SHEETROCK Wallboard is tapered and wrapped along the long dimension to facilitate joint treatment. Exposed ends (butts) along the short dimension are not tapered.) Wherever possible, SHEETROCK should be applied horizontally and in lengths to span ceilings and walls without end (butt) joints. If butt joints occur, they should be staggered and located as far from the center of walls and ceilings as possible.
- All ends and edges of SHEETROCK Wallboard must be supported on framing members, except edges at right angles to framing in horizontal application and face layer of Double-Layer application and where end joints are to be back-blocked and floated. For description of Back-Blocking, see Chapter 3.
- If metal trim is to be installed around edges, doors, or windows, determine if trim is to be installed on framing prior to application of wallboard. Refer to Chapter 2 for description of products and to Chapter 3 for description of installations.

- Wallboard surfaces should not be firmly anchored across the flat grain of wide dimensional lumber such as floor joists and headers. Wallboard should be floated over these members or provided with a control joint to handle wood shrinkage. See Chapter 3 for description of installation.

Measuring—All measurements must be accurate. Two measurements should be made as a check, one on the other. In addition, this procedure will usually warn applicator of partitions or door frames that are out of plumb so that allowances in cutting may be made. A 12-foot steel tape rule is recommended. All tools for measuring and cutting are illustrated and described in detail in Chapter 7—Tools.

Cutting—Straight line cuts across full width or length of board are made by scoring face paper, snapping core of board, and then cutting back paper. The common tool used to score and cut gypsum wallboard is a Stanley wallboard trimming knife. Regardless of type used, blade should always be kept sharp so that score will be made through paper into core of gypsum wallboard.

Use of a straight edge is recommended. An aluminum 4-foot T-square, ruled on both sides, facilitates clean, straight cuts.



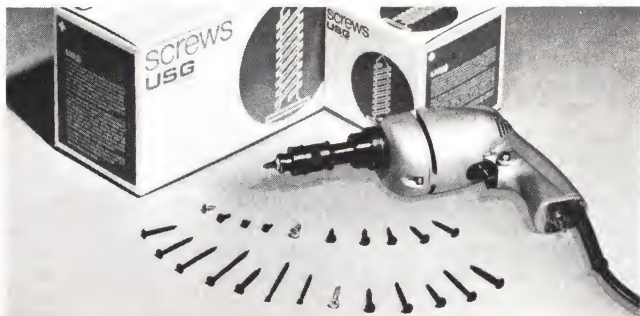
Score paper on face of board with cutting knife, using a straight edge as a guide.



Break the gypsum core of SHEETROCK by snapping or bending away from the scored paper side. Complete cutting by running knife through back paper from above or below.



Smooth cut edges with a rasp, coarse sandpaper or metal lath wrapped around a block of wood, or trim with a cutting knife.



Fastening—SHEETROCK Wallboard is fastened to wood framing with either nails or screws. Traditionally, nails have been the sole fastening means for wallboard constructions, but use of the USG Brand Screw—Type W is the best known insurance against fastener pops caused by loosely attached board. 1¼" USG Brand Screws—Type W are applied with a positive-clutch electric power-driven screwdriver equipped with an adjustable screw depth control head and a Phillips bit.

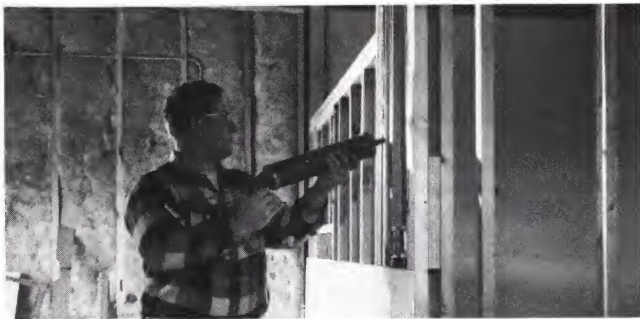
Extensive comparison tests have shown the superiority of the screw over the GWB-54 annular ring nail, itself the most effective of nail fasteners. Compared to the nail, the screw offers:

- Over 100% greater withdrawal resistance.
- Over 100% greater "push-off" resistance.
- Reduced incidence of loose board.
- Increased coating protection against rust.
- Reduced fastener head defects, resulting in fewer call-backs.
- Tighter attachment of SHEETROCK Wallboard to framing.
- Fewer fasteners, less spotting and joint compound needed.
- Elimination of paper tearing and core fracturing associated with nailing.

Alternate methods for fastening wallboard to wood framing:

1. Double Nailing System—for minimizing defects due to loosely nailed wallboard by placing second nails within 2" of first nails.





2. Adhesive Nail-on System—A continuous bead of DURABOND 200 or 300 Stud Adhesive is applied to framing plus supplementary nailing; improves bond strength by 50% to 100%, greatly reduces face nailing needed.

Drywall screws are the accepted fasteners for attaching wallboard to light-gauge steel studs and channels. Intensive engineering research has produced the USG Brand Type S Screw—a fastener clearly superior to the conventional drywall screw. The HI and LO double lead threads and reduced shank diameter produce these added features:

- More gripping area—greater holding power.
- 35%-50% faster penetration—more screws driven per day.
- 40% less driving torque—reduced operator fatigue—screw guns last longer.
- . . . plus self-drilling, self-tapping, milled drilling point.
- patented bugle head.

Specifications for recommended nails and drywall screws are given in Chapter 2—Products. The spacing of fasteners is included in the description of each type of wallboard application in Chapter 3. For fastener specifications used in specific drywall systems, see Chapter 4 or consult the official test report.

general recommendations for joint treatment

The growth of drywall construction in the building industry is due largely to the development and improvement of joint finishing methods. U.S.G., the originator and developer of modern joint treatment, is continuing to perfect products with overall qualities that provide the best, most uniform finished result. The most recent of these are USG Brand Joint Compounds, a complete new group of non-casein type powder compounds, that are ready to use as soon as mixed; SHEETROCK SW Wallboard, with an exclusive eased-edge design, and DURABOND 90 Joint Compound, which to-

gether offer stronger joints and reduced imperfections in finishing. DURABOND 90 Joint Compound is used to pre-fill the V-joint formed by the rounded edges of SHEETROCK SW; conventional taping and finishing complete the joint.

In spite of all a manufacturer does to produce quality products, satisfactory appearance and performance on interior walls and ceilings are in the hands of the applicator. The quality of his work determines how well wallboard joints are reinforced and concealed and fastener heads covered. His planning and skill will determine the quality of the finished surface.

Occasionally, during construction, problems arise which are beyond the control of the manufacturer. Nevertheless, through his experience, the manufacturer has developed improved products and methods of use to overcome recurrent problems. The dry-wall applicator can save time, trouble and expense by observing proper precautions and, in the event that difficulties arise, by making a complete and frank appraisal of his work. The following are precautionary measures designed to prevent problems.

Check Compatibility—All USG Brand Compounds are compatible with each other, including USG Ready-Mixed Joint Compound-All Purpose. USG Brand Compounds may be used over hardened DURABOND Joint Compound and DURABOND 90. Most casein-based joint compounds, including PERF-A-TAPE Joint Compounds made by U.S.G., are not compatible with the USG Brand Joint Compounds; and problems may result if any attempt is made to mix them together or use them successively on the same joint.

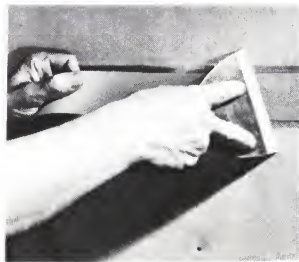
Protect Materials—Store joint treatment in a dry place and rotate stocks; age and dampness affect the working qualities of this material. Protect Ready-Mixed Compounds from freezing.

Check Working Surfaces—Gypsum wallboard must be firmly attached to framing members without cutting the surface paper or fracturing the core of the board. Make certain each board forms a true, even alignment at each joint. Check width and depth of taper in the board.

Mix Carefully—Use clean containers and mixing tools. Follow directions for mixing the particular joint compound shown on the package. Use clean drinkable water for mixing. Add powdered compounds to the water. *Do not over-thin compound with water.*



Pre-fill to edge only.



Avoid heavy fills.

Pre-Fill to Edge Only—On SHEETROCK SW Wallboard, pre-fill joints with DURABOND 90 Joint Compound and remove excess material from flat surfaces (beyond rounded edges).

Avoid Heavy Fills—Embedded tape should have joint compound completely surrounding it *but not more than* $\frac{1}{64}$ " thickness under the feather edge.

Use Three Coats—Three coat work is essential for quality results.

Dry Properly—Allow joint compound to dry properly before applying second and third coats or decorating. Because it hardens chemically, the DURABOND Joint System will perform better than other types under slow drying conditions. Avoid rapid drying. Do not over-thin compound.

Maintain Equipment—Keep mechanical equipment in perfect working order and replace parts at the slightest sign of wear.

Follow the complete application procedures outlined in Chapter 3. Joint treatment product descriptions and specifications are found in Chapter 2.

general recommendations for decorating

Quality drywall construction merits equally good decoration, and the wise applicator will recommend paints that enhance the appearance of his finished job. For smooth walls U.S.G. specifically developed SHEETROCK Sealer and TEXOLITE Primer-Sealer to lay the nap of face paper raised by sanding. Either will give a satisfactory base coat for SHEETROCK Finish Coat, GRAND PRIZE or TEXOLITE Alkyd Latex Paint, and other quality interior finishes. U.S.G. also manufactures a full line of texturing materials to meet the preference of every customer. Refer to Chapter 2 for the Selector Guide to U.S.G. Paint Products.

Good practices for decorating require that:

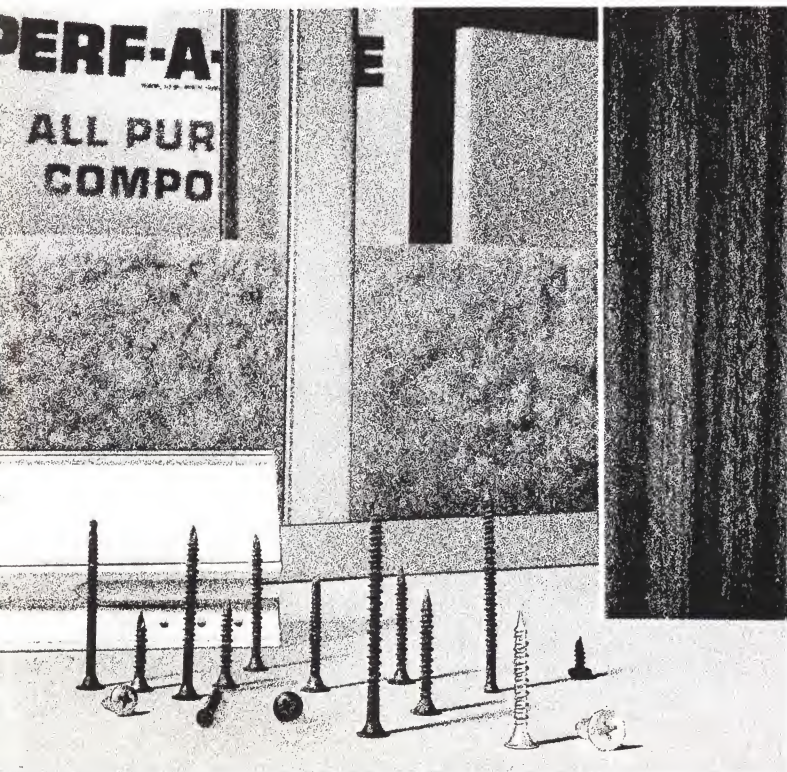
1. All surfaces, including joint treatment compounds, must be dry, sound, clean, free of dust, grease or oil.
2. Paints should be delivered in original unopened containers and protected from damage and tampering.
3. All materials should be used according to instructions.
4. Wallboard joints and fasteners should be treated with a U.S.G. Joint System in accordance with directions.

chapter 2

products



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QUALITY PRODUCTS FOR DRYWALL CONSTRUCTION

There is only one SHEETROCK—the interior wall and ceiling surface developed and improved by United States Gypsum. It is the product which has dominated the “drywall” revolution in residential construction. Systems using SHEETROCK wallboard have now gained the same acceptance in commercial building.

SHEETROCK is manufactured in seven different forms for special purposes. Complementing these is the industry's broadest line of metal accessories, fasteners, adhesives, joint treatment products and paints to provide complete partition and ceiling assemblies for dozens of specific applications.

The products described and illustrated in this section are the basic materials recommended by United States Gypsum Company for gypsum drywall construction. These materials are designed to meet the essential requirements of economy, speed of installation, strength, fire resistance, and ease of decoration which are characteristic of quality drywall. U.S.G. drywall methods and materials are the result of years of experience in the field of building materials. They have been developed to achieve the optimum results based on extensive laboratory tests and job-proven performance. The United States Gypsum Company trademark is your assurance of a product of proven quality to meet your construction needs.

United States Gypsum maintains special wallboard sales representatives to consult with contractors, architects and dealers on wallboard products and systems and their application to special job problems and conditions. They may be reached through the nearest U.S.G. sales office (listed inside back cover) or by directing inquiries to United States Gypsum, Dept. 147-2, 101 S. Wacker Dr., Chicago, Illinois, 60606.

SHEETROCK wallboard

DESCRIPTION

SHEETROCK is a mill-fabricated gypsum wallboard composed of a fireproof gypsum core encased in a heavy manila-finished paper on the face side and a strong liner paper on the back side. The face paper is folded around the long edges to reinforce and protect the core, and the ends are square-cut and finished smooth.

SHEETROCK Wallboard complies with Federal Specification SS-L-30c; ASTM C36.

ADVANTAGES

Interior walls and ceilings built with SHEETROCK have a durable surface suitable for most types of decorative treatment and for repeated decoration during the life of the building. The joints between adjacent boards may be reinforced and concealed with

a U.S.G. Joint System, or may be featured by leaving exposed or covering with a decorative moulding.

Drywall Construction—mill-fabricated boards eliminate excessive moisture in construction.

Fire Resistance—Up to 2 hours for partition, 3 hours for floor-ceiling and 4 hours for column fireproofing constructions have been obtained. See Chapter 5 for fire resistance ratings and related construction.

Sound Control—SHEETROCK Wallboard is a vital component in partition and floor-ceiling systems having excellent sound resistive properties. See Chapter 5 for sound ratings.

Crack Resistance—Exceptionally resistant to cracks caused by minor frame movement, vibration or settlement.

Quickly and Easily Applied—keeps construction costs low.

Readily Decorated—with paint, texture, or wallpaper.

Warp Resistant—under normal atmospheric changes.

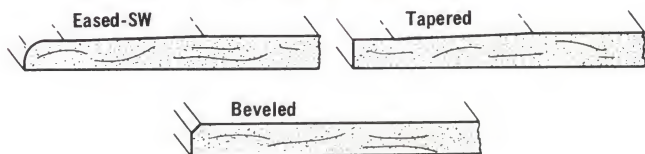
Availability—27 strategically located U.S.G. operating plants produce and/or stock the gypsum board materials described here. Five warehouse facilities, in addition to these plants, increase the total distribution and service efficiency to major markets and rural areas from coast to coast. All standard or specialty gypsum board products are readily available upon short notice.

GENERAL LIMITATIONS

1. Not recommended where exposure to moisture is extreme or continuous.
2. Must be adequately protected against wetting when used as a base for ceramic or other wall tile (see Insulating SHEETROCK limitation). SHEETROCK W/R Wallboard is the recommended product for this purpose.
3. Maximum framing spacing: $\frac{1}{2}$ " and $\frac{5}{8}$ " SHEETROCK Wallboard is designed for framing centers from 16" to 24"; $\frac{3}{8}$ " SHEETROCK, on centers up to 16". When $\frac{1}{2}$ " or $\frac{5}{8}$ " SHEETROCK Wallboard is applied across framing on 24" centers and wallboard joints reinforced, headers are not required.
4. Nail application of SHEETROCK over $\frac{3}{4}$ " wood furring applied across framing is not recommended since the relative flexibility of the furring under impact of the hammer tends to loosen nails already driven. Furring should be 2"x2" minimum.
5. The application of SHEETROCK over an insulating blanket, that has first been installed continuously across the face of the framing members, is not recommended. Blankets should be recessed and the blanket flanges attached to sides of studs or joists.

TYPES OF SHEETROCK WALLBOARD

Types of Edges



SHEETROCK SW Wallboard is United States Gypsum's revolutionary new development to minimize ridging or beading and other joint imperfections. Its exclusive eased-edge design helps to compensate for twisted framing, offset joints, poor framing alignment, damaged board edges, and extremes of temperature and humidity. One of drywall's foremost advances in 40 years, the SHEETROCK SW Wallboard system produces the strongest joint ever developed.

This is accomplished by pre-filling joints with multi-purpose DURABOND 90 Joint Compound, a new formulation which chemically hardens in about one hour, providing maximum bond and minimum shrinkage. The new edge contour eliminates the need to crown joints, and generally no more compound is required than with regular wallboard. Taping and other application procedures are conventional.

Except for the eased edge, SHEETROCK SW is tapered like, and otherwise identical to, regular tapered edge wallboard. Made in three thicknesses:

- $\frac{5}{8}$ ", recommended for the finest single layer drywall construction. The greater thickness provides increased resistance to fire exposure and transmission of sound.
- $\frac{1}{2}$ ", for single layer application in new residential construction.
- $\frac{3}{8}$ ", lightweight, applied principally in the double wall system and in repair and remodel work. Not recommended over metal framing.

Width: 4'; length: 8', 9', 10', 12' or 14'; edges: rounded, tapered; finish: ivory manila paper, suitable for paint or other decoration.

Tapered Edge SHEETROCK has long edges tapered on the face side in order to form a shallow channel for the joint reinforcement which provides smooth, continuous wall and ceiling surfaces. Made in the same thicknesses as SHEETROCK SW Wallboard and in one other thickness:

- $\frac{1}{4}$ ", a lightweight, low-cost utility board, used as a base layer for improving sound control in double-layer metal and wood stud partitions and for use over old wall and ceiling surfaces. Width: 4'; length: 8', 10'; edges: tapered; finish: ivory manila paper, suitable for paint, wallpaper or other decoration.

Fire hazard classification of SHEETROCK Wallboard is: flame spread, 15; fuel contributed, 15; smoke developed, 0.

SHEETROCK SW FIRECODE Wallboard, made in $\frac{5}{8}$ " and $\frac{1}{2}$ " thicknesses, combines all the advantages of Regular SHEETROCK with additional resistance to fire exposure—the result of a specially formulated mineral core.

$\frac{1}{2}$ " FIRECODE "C" Wallboard makes possible fire ratings in floor-ceiling constructions previously obtained only with $\frac{5}{8}$ " gypsum wallboard. In accordance with Underwriters' Laboratories tests, certain partition, floor-ceiling, and column fireproofing constructions afford 45-minute to 4-hour fire resistance ratings. These products are used in 3-hour floor and ceiling, 2-hour wall and 2, 3 and 4-hour column fireproofing constructions as listed by Underwriters' Laboratories (see Chapter 5).

Limitations in addition to General Limitations for SHEETROCK Wallboard: (1) In order to attain fire resistance ratings, the construction of the partition and/or floor and ceiling assemblies must be in accordance with the respective Underwriters' Laboratories, Inc., panel designs. See Chapter 4—Systems, for description of panel constructions. (2) Maximum spacing of frame members: 24" c. to c.

Width: 4'; length: 8', 9', 10', 12' or 14'; edges: rounded, tapered; finish: ivory manila paper, suitable for paint, wallpaper or other decoration.

Insulating SHEETROCK Wallboard is made by laminating a sheet of bright aluminum foil on the back surface of SHEETROCK Wallboard. It is effective as a vapor barrier for exterior walls and ceilings when applied (1) with foil surface next to the studs in single layer application, or (2) as the base layer (with foil surface next to the studs) in the double layer system. A significant thermal insulating value is achieved when SHEETROCK is installed with the aluminum foil facing an air space of $\frac{3}{4}$ " minimum. The metal foil reduces outward heat flow in winter, and inward heat flow in summer.

Insulating SHEETROCK also provides an efficient vapor barrier



which resists the passage of moisture vapor through the exterior wall and roof construction. The possibility of condensation within an exterior wall and resulting exterior paint failures is minimized. Meets ASTM requirements for a vapor permeability not exceeding 0.30 perm.

Limitation: do not use as a base for ceramic or other tile. Thickness: $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{5}{8}$ ". Sizes, edges and finish are same as for SHEETROCK SW and regular Tapered Edge SHEETROCK.

Thermal resistance (R) value Insulating SHEETROCK Wallboard (1)

Thickness	$\frac{1}{2}$ "	$\frac{5}{8}$ "
wall application	3.93	4.04
ceiling application		
summer conditions	4.92	5.03
winter conditions	2.73	2.84

(1) Resistances based on inside still air film, board thickness and one reflective surface facing a $\frac{3}{4}$ " min. still air space.

SHEETROCK W/R Gypsum Wallboard is a water-resistant gypsum wallboard that provides an excellent base for the adhesive application of ceramic, metal, and plastic tile. It is water-resistant all the way through: (1) multi-layered face and back paper is chemically treated to combat penetration of moisture; (2) the gypsum core is made water-resistant with a special asphalt composition. It was developed for application in bathrooms, powder rooms, kitchens, utility rooms, and other high-moisture areas. SHEETROCK W/R Gypsum Wallboard is easily recognized because of its distinctive green face.

In addition to its use as a superior tile base in new construction, SHEETROCK W/R Wallboard is a cost-saver in modernization work. It permits new tilework to be installed over existing surfaces without tearing out old walls.

Limitations: adherence to recommendations concerning sealing exposed edges, painting, tile adhesives, framing and installation is necessary for satisfactory performance (see Chapter 3). Not recommended for use as an exterior soffit or in other exterior areas subjected to sustained high humidity and moisture conditions.

Available in plain core, $\frac{1}{2}$ " and $\frac{5}{8}$ " thickness; also in $\frac{5}{8}$ " SHEETROCK W/R FIRECODE "C" Wallboard for applications where a 1-hour fire rating is desired—listed under UL Label Service R-1319-84 with following design numbers applicable: 5-1 hr., 16-1 hr., 4-2 hrs. and 11-2 hrs. Width: 4'; length: 8', 10' or 12'; edges: tapered; finish: green treated manila paper, suitable for receiving tile, paint or wallpaper.

SHEETROCK Brand W/R Spray Sealant is applied to all raw cut edges and nail heads of special SHEETROCK Water-Resistant Gypsum Wallboard used in high-moisture room areas—thus protecting the gypsum core from moisture penetration. Packaged in aerosol spray container for fast, easy application: twelve 16-oz. cans per ctn.; weight: 14 lbs.

Table I. SHEETROCK Wallboard Specifications

Thickness	Type	Edge	Width	Approx. Weight Lbs. per MSF
5/8"	Regular	Rounded or Tapered	48"	2,375
	FIRECODE	Rounded or Tapered	48"	2,475
	FIRECODE "C"	Rounded or Tapered	48"	2,475
	Insulating	Rounded or Tapered	48"	2,400
	FIRECODE Insulating	Tapered	48"	2,500
	W/R	Tapered	48"	2,375
	W/R FIRECODE "C"	Tapered	48"	2,475
1/2"	Regular	Rounded, Tapered, or Beveled	48"	1,875
	FIRECODE	Tapered	48"	1,975
	FIRECODE "C"	Rounded or Tapered	48"	1,975
	Insulating	Rounded or Tapered	48"	1,900
	FIRECODE Insulating	Tapered	48"	2,000
	W/R	Tapered	48"	1,875
3/8"	Regular	Rounded, Tapered, or Beveled	48"	1,475
	Insulating	Tapered	48"	1,500
1/4"	Regular	Tapered	48"	1,097

predecorated panels

TEXTONE Gypsum Panels come in six groups of standard and custom products to make up United States Gypsum's comprehensive line of factory laminated vinyl-faced wallboards. With a newly broadened range of color, pattern and texture, TEXTONE Panels enable the contractor to capitalize on the sweeping popularity of vinyl wall coverings in commercial and residential uses.

All styles of TEXTONE Gypsum Panels give the customer the important advantages of factory lamination over job application of vinyl material to wallboard. There the vinyl can be laminated with proper adhesives, under controlled conditions of heat and pressure. Thus expensive fabric backing is not necessary. TEXTONE Standard Panels offer this economy.

The savings realized through use of factory-finished vinyl wallboard panels can be applied to upgrade the partition function. The fast-rising costs of job lamination are eliminated, and a lighter weight material may be used with equal results. Better adhesion, and hence better snag resistance, result. This is of particular significance where walls take heavy abuse.

Even before the partition is installed, the vinyl surface has passed two professional inspections—one by the vinyl maker, the other by the wallboard producer—to assure the customer of quality wall and covering material.

TEXTONE Standard Panels, stocked in most U.S.G. plants, have a rugged 8-mil unbacked vinyl film that is printed and embossed for texture or grain effect, then factory-laminated to 1/2" SHEETROCK Wallboard. This provides long-lasting resistance to stains and scuffs, plus ready washability. All panels except wood-

grains have beveled edges which form a pleasing "V" groove at the joint; no further treatment needed. Woodgrains are square-edged. The regular gypsum core provides fire resistance.

The coordinated line of Standard panels offer a range of 17 harmonizing colors and textures. They include 8 solid colors in a subtle stipple finish, four linen finishes, a special fissured Golden Travertine pattern, and four realistic woodgrains with or without a grooved, random planking like fine wood paneling. The panels are adaptable to any U.S.G. drywall partition system (Chapter 4), including wood-framed, metal framed and laminated types. Adhesive, nail or screw attachment is used—matching aluminum moldings are available. Panels also are ideal for resurfacing, by nailing or adhesive application.

Thickness: $\frac{1}{2}$ "; width 4'; lengths 8', 9' or 10'. Other thicknesses available on special order.

TEXTONE Gypsum Panels meet Federal Specification SS-L-30c, ASTM C36-64. May be produced on special order with fabric supported vinyl to meet Federal Specification CCC-W-408, Type I and II.

Limitation: Only DURABOND 200 or 300 Stud Adhesive should be used to apply TEXTONE Gypsum Panels to wood or metal framing or furring; DURABOND 500 or 600 Contact Adhesive should be used for application to gypsum wallboard, masonry or other sound surface. Because of the potential incompatibility between vinyl-surfaced wallboard and solvent-based adhesives, United States Gypsum cannot be responsible for problems arising from the use of either its adhesives with vinyl-surfaced wallboard manufactured by others, or its vinyl-surfaced wallboard applied with adhesives made by others.

TEXTONE Vinyl Wallcovering, a supported vinyl film, 54" wide, with a 1.3-oz per sq. yd. cotton backing, is available separately in limited quantities to provide a commercial match with Standard TEXTONE Panels colors, textures and patterns on adjacent walls and columns.

TEXTONE Smoothwall Panels have a factory-laminated fabric-backed vinyl film surface. Extra vinyl flaps at each long panel edge permit job-fabricated flush joints with nearly invisible butt seams in vinyl facing. Available in same colors and textures as TEXTONE Standard Panels. Film is backed with cotton sheeting; weighs 8 oz. per sq. yd. Flaps: 2" wide one side; 4" wide other side. Fire hazard classification: flame spread 25, fuel contributed 15, smoke developed 10. Thickness: $\frac{1}{2}$ ", width: 48", length: 8', 9', or 10'.

TEXTONE Vicrtex, Vicrtex-T and Vicrwall Panels couple the advantages of factory lamination with a cloth-backed vinyl facing weighing 12 to 24 oz. per sq. yd. A selection of some 363 colors and 16 different patterns is offered in the three products.

TEXTONE Vicrtex Panels come in 290 colors and 14 deep-relief patterns including straw cloth, burlaps, linens, fine net weaves, heavy stipples, travertines, woodgrain effects; fabric backing of 4.8-oz. per sq. yd. drill cloth, 68x40 weave and count.

TEXTONE Vicrtex-T Panels offer a choice of 38 colors in two patterns, all treated with stain-resistant ½-mil polyvinyl fluoride DuPont TEDLAR® film for added durability and easier cleaning; fabric backing of 2.1-oz. per sq. yd. cotton sheeting, 48x42 weave and count.

TEXTONE Vicrwall Panels are available in 35 colors, two lower-priced patterns, consisting of a durable 7.5-mil vinyl film with fabric backing of 2.1-oz. per sq. yd. cotton sheeting, 48x42 weave and count.

Manufactured in a minimum quantity of 3,600 sq. ft. per color, these panels come with beveled edge (except square-edge woodgrains), 24" and 48" widths, lengths as specified, in following thicknesses: ⅜", ½" or ⅝" for plain core; ½" for SHEETROCK FIRECODE "C"; ⅝" for SHEETROCK FIRECODE. Partitions faced with this material thus can meet fire ratings with specially fortified wallboard (see Chapter 4).

Vicrtex and Vicrwall are registered trademarks of L. E. Carpenter & Co.

TEXTONE Custom Gypsum Panels extend the selection of U.S.G. vinyl-faced wallboard panels by a further 77 colors in the nine vari-textured patterns. Like TEXTONE Standard Panels, the Custom Panels come with a surface of 8-mil laminated unbacked vinyl film, but are manufactured in a minimum order of 12,000 sq. ft. per color and texture.

The complete range of custom colors offered in each pattern includes three life-like new woodgrains, plus 21 colors in the Stipple design, 12 in Looma, 10 in Belgique, 6 in Travertine, 8 in Espania, and 17 in Kelley. TEXTONE Custom Panels are available with beveled edge for all patterns except the woodgrains which are square edge. In 48" width, 8, 9 and 10-ft. lengths, in following thicknesses: ⅜", ½" or ⅝" for plain core, ½" for SHEETROCK FIRECODE "C", ⅝" for SHEETROCK FIRECODE.

Table I-A. Fire Hazard Classification (1)

TEXTONE Panels type	flame spread	fuel contributed	smoke developed
Standard(2)	36	13	35
Smoothwall(2)	25	15	10
Vicrtex(3)	15-25	5-10	0-10
Vicrtex-T	15	10	0
Vicrwall	20	5	0
Custom(2)	36	13	35

(1) Vinyl surface film tested in accordance with ASTM E84. (2) Film attached to gypsum board. (3) Varies depending on vinyl film used. See U.S.G. Architectural Technical Folder on TEXTONE Gypsum Panels.

ULTRAWALL Panels are a popular selection for economical but attractive paneling in home recreation rooms and other wall surfaces. They combine the fire protection of a gypsum core with the beauty of a coated paper surface that is embossed with wood pores to simulate fine natural wood paneling. The panels have actual indented V-grooves that give the appearance of continuous random plank paneling when applied. There's no harmful warping, shrinking, splintering—no finishing in application, and no redecorating in future. The finish may be treated with clear or opaque coatings if additional protection is desired. In maintenance, the panels wipe clean with a damp cloth.

Matching colored nails are used for inconspicuous nailing; panels also may be adhesively applied to a gypsum board base layer or directly to wood studs or furring strips. Matching aluminum moldings are available for joints and corners. Joints are virtually indistinguishable and normally are left exposed.

Thickness: $\frac{3}{8}$ "; width: 4'; length: 7', 8', 9' or 10'; edges: square; finish: Walnut, Cherrywood, Bombay Teak, Light Oak, Rosewood.

Table II. Predecorated Panel Specifications

Thickness	Type	Edge	Width	Approx. Weight Lbs. per MSF
$\frac{1}{2}$ "	TEXTONE Standard	Beveled (1)	48"	1,950 (2)
$\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ "	TEXTONE Vicrtex, Vicrtex-T, Vicrwall	Beveled (1)	24" & 48"	1,950 (2)
$\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ "	TEXTONE Custom	Beveled (1)	48"	1,950 (2)
$\frac{3}{8}$ "	ULTRAWALL	Square	48"	1,500

(1) Woodgrains are square edge. (2) Weight for $\frac{1}{2}$ " thickness, plain core.

coreboard and backing products

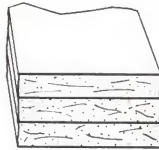
1" USG Coreboard is a solid gypsum board product fabricated for use with the USG Solid, Double Solid and Triple Solid Partitions (see Chapter 4 for construction details). Additional layers of gypsum board are generally laminated to the coreboard to provide the completed wall assembly. When used in conjunction with the 2" Solid, Double and Triple Solid Partitions, coreboard is manufactured with an integrally formed "V" T & G edge. USG Coreboard, as used with semi-solid partitions, is available in 1"x24" panels prescored either 6" or 8" o.c. Coreboard strips are then easily snapped and separated from this master unit. Thickness: 1"; width: 24"; edges: "V" T & G or square; length: 8', 9', 10' and 12' (prescored—7'8" lengths only); finish: gray paper, not suitable as an exposed surface.

Types of Edges





gypsum rib
1" x 6"



gypsum stud
1½" x 6"

USG Gypsum Studs and Ribs are made in two thicknesses and stock lengths to serve as non-load bearing internal members of four USG Studwall and Ribwall partition systems. The 1½"x6" Gypsum Stud is factory-laminated from one layer ⅝" SHEETROCK Gypsum Wallboard sandwiched between two layers of ½" SHEETROCK, and is used in the USG Studwall #258 and #278 partition (see Chapter 4) as well as in the USG Ribwall #368 partition. The 1"x6" Gypsum Rib is snapped and separated on the job from stock lengths of 1"x24" USG Coreboard prescored 6" o.c., and is used in the USG Ribwall #418 dry-wall partition. PERF-A-TAPE Joint Compound-Taping or DURABOND 500 Mastic Contact Adhesive is used in laminating studs and ribs to base layer or face panels.

BAXBORD Gypsum Backing Board is a low cost, easy-to-handle gypsum board encased on both sides with strong gray paper, made in three thicknesses:

⅜" BAXBORD, for use as a base for the job-laminated Double Layer SHEETROCK Wallboard Partition system. It may also be used as a base for acoustical tile when applied perpendicular to wood joists spaced not over 16" o.c.

½" BAXBORD, the recommended base for adhesively or mechanically applied acoustical tile. It may be screw applied to the USG Metal Furring Channel; nailed to metal furring members or nailable steel joists; or nailed to wood framing.

⅝" BAXBORD FIRECODE, for use as a base for adhesive or mechanical application of acoustical tile in one-hour fire-rated systems. "V" tongue and groove edges minimize air and dirt infiltration.

Limitations: (1) In order to attain fire resistance ratings with ⅝" BAXBORD FIRECODE backing board, the construction must be in accordance with the floor or roof and ceiling design listed by Underwriters' Laboratories, Inc. (see Chapter 5). (2) Where ½" or ⅝" BAXBORD is to be used as acoustical tile base, store acoustical tile and base in a dry area protected from the elements. Provide flat, solid support during storage. Take necessary precautions to prevent condensation in the storage area and within the structure in which the acoustical base is applied.

Finish: gray paper, not suitable as an exposed surface.

Insulating BAXBORD Gypsum Backing Board is made in the same three thicknesses as standard BAXBORD, but with

aluminum foil laminated to the back surface. It functions as a vapor barrier and as thermal insulation in the same manner as Insulating SHEETROCK Wallboard. Widths, edges and face side finish are identical with standard BAXBORD (above); length: 8'.

Table III. Backing Board Specifications

Thickness	Type	Edge	Width	Length	Approx. Weight Lbs. per MSF
5/8"	BAXBORD	"V"-T&G	24"	8'	2,375
	BAXBORD FIRECODE	"V"-T&G	24"	8'	2,475
	BAXBORD FIRECODE	Square	48"	8'	2,475
	BAXBORD FIRECODE Insulating	Square	48"	8'	2,500
	BAXBORD Insulating	"V"-T&G	24"	8'	2,400
	BAXBORD FIRECODE Insulating	"V"-T&G	24"	8'	2,500
1/2"	BAXBORD	Square	24"	8'	1,875
	BAXBORD	"V"-T&G	24"	8'	1,875
	BAXBORD	Square	48"	8', 12'	1,875
	BAXBORD Insulating	"V"-T&G	24"	8'	1,900
	BAXBORD Insulating	Square	24", 48"	8'	1,900
3/8"	BAXBORD	Square	24"	8'	1,475
	BAXBORD	Square	48"	8', 12'	1,475
	BAXBORD Insulating	Square	24", 48"	8'	1,500
1"	Coreboard	"V"-T&G	24"	Various	4,150
	Coreboard (Prescored 6" & 8")	Square	24"	Various	4,150

FIRECODE Sheathing is a fireproof gypsum board with an asphalted gypsum core encased in specially formulated brown water-repellent paper on both sides and long edges. Its weather resistance, water repellence, fire resistance and low applied cost make it a popular choice for use in garden apartments and light construction as well as in homes.

FIRECODE Sheathing is an ideal base for a wide range of exterior finishes—masonry veneer, wood clapboard and aluminum siding, wood and asbestos shingles, and stucco—applied by fastening through the sheathing into the framing. Used over wood framing or 20-ga. USG Metal Studs in Exterior Curtain Wall System (see Chapter 4).

Available in two types: 24" wide, 8' length, with V-shaped T&G long edges, normally applied horizontally, and 48" wide, 8' and 9' lengths, with square edges applied vertically to meet FHA requirements for omission of corner bracing in wood frame construction. Other features:

Fire Protection—The asphalted gypsum core is incombustible and will not transmit high temperatures until completely calcined. FIRECODE Sheathing is the only commonly used type of sheathing that is fire resistant.

Weather Resistance—The heavy brown paper covering actually sheds water permitting open storage on the job and exposure on the framing. Building paper not required except where codes

require it over all sheathing. Complies with water resistance requirements of ASTM designation C79-52. Tight joints minimize wind and rain penetration.

Low Applied Cost—Sheathing is quickly cut or scored and snapped, waste is negligible, application faster than with plywood or wood sheathing.

Structural Strength—Superior in bracing and stiffening. Tests have shown lateral distortion of only .498" under a racking load of 1,850 lbs.

Insulation Value—Possesses thermal conductance of 2.86, thermal resistance of 0.35. Combined with THERMAFIBER Insulating Wool blankets in an exterior wall assembly, a low "U" factor of .11 can be obtained in a wood framed assembly and .06 in a metal stud curtain wall.

Vapor Permeability—Average of 27.3 perms permits escape of moisture, minimizing rotting of framing. For effective vapor control, should be used in combination with foil-backed SHEETROCK Wallboard or BAXBORD Backing Board, or with THERMAFIBER Silver Shield Insulating Wool.

Limitations: (1) Not to be considered a vapor barrier. (2) Exterior finishes—wood siding, wood furring strips, stuccomesh, wall ties, etc.—must be secured to the framing by fastening through the sheathing. (3) Not recommended as a base for ceramic tile—use SHEETROCK W/R Wallboard. (4) With 2'x8' size, diagonal corner braces should be installed at all external corners.

Table IV. FIRECODE Sheathing Specifications

Thick- ness	Type Edge	Size	Approx. Wt. Lbs. per MSF	Insul. Value	Meets Federal Specs.
1/2"	T&G	2'x8'	2,000	.35(k)	SS-L-30c, Type Z
1/2"	Sq.	4'x8'	2,000	.35(k)	SS-S-276
1/2"	Sq.	4'x9'	2,000	.35(k)	ASTM C79 FHA Tech. Circ. No. 12 (4'x8' and 4'x9' sizes only)

USG Exterior Gypsum Ceiling Board is a new weather-resistant board designed for use on the soffit side of eaves, canopies and carports and other exterior applications with indirect exposure to the weather. It is incombustible, is simply scored and snapped for quick application, and offers excellent paintability. Most important are its sag and water-resistance advantages—which independent tests have shown to be better than exterior grade plywood and structural laminated paper board.

Installed conventionally in wood and metal-framed soffits (see Chapter 3); batten strips recommended over butt joints; backing strips required for small vent openings. Can be identified by its brown back paper and light beige, water-repellent face paper; available in 1/2" thickness, 4' widths and 8', 9', 10', 12' and 14' lengths; also available in foil-backed version for extreme humidity conditions.



PYROBAR Gypsum Tile is a precast kiln dried gypsum tile that is easily laid up with gypsum mortar to make non-load bearing column fireproofing and interior partitions. A base of 2" solid or 3" hollow PYROBAR with SHEETROCK FIRECODE Wallboard facing affords a fire-resistance rating of 4 hours as column fireproofing.

PYROBAR is machine molded into large lightweight units 12"x30" in size. It is easily cut, handled and quickly installed using RED TOP Partition Tile Cement and sand as mortar. Units weigh 30% to 50% less and require fewer joints and mortar than other commonly used masonry units. PYROBAR Tile complies with ASTM C52, Fed. Spec. SS-T-00316a.

Thickness: 2" solid, 3" hollow for column fireproofing; 3" solid and 3", 4" and 6" hollow for partitions.

Table V. PYROBAR Gypsum Tile—Specifications

Product	Approx. Tile Wt. (psf)	RED TOP Partition Tile Cement (100-lb. bags/MSF)	Sand (cu. ft./MSF)
2" solid	10	5	15
3" solid	14.5	8	24
3" hollow	10	8	24
4" hollow	12.5	10	30
6" hollow	20.5	15	45

wallboard trim accessories

USG trim accessories—corner reinforcements, casing beads, metal trims, control joints and decorative moldings—enjoy the industry's top acceptance because of their dependability and continual improvement in design.

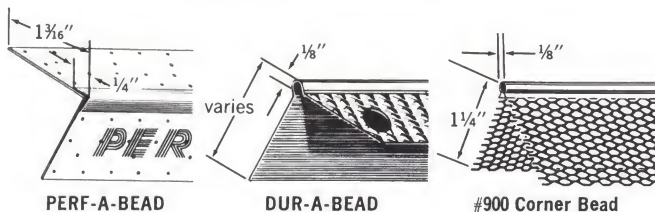
CORNER BEAD

USG corner reinforcements provide true and straight lines for smooth finishing at outside wallboard corners. The exposed bead also helps prevent damage from impact.

No. 100 PERF-A-BEAD is a metal corner reinforcement formed of galvanized steel with PERF-A-TAPE wings $1\frac{3}{16}$ " wide. Easily applied with U.S.G. joint compounds; provides lasting protection for external corners.

DUR-A-BEAD is an all-metal heavy gauge hot dipped galvanized steel reinforcement for protecting external corners. It is nailed to framing through gypsum wallboard and concealed with U.S.G. joint compounds for smooth, finished corners. Available in two flange widths: **No. 101** $1'' \times 1''$; **No. 103** $1\frac{1}{4}'' \times 1\frac{1}{4}''$. Also available in lighter gauge **ECONO** models: **Standard** $15/16'' \times 15/16''$; **No. 102** $1'' \times 1\frac{1}{4}''$; **No. 103** $1\frac{1}{4}'' \times 1\frac{1}{4}''$; **No. 104** $1\frac{1}{8}'' \times 1\frac{1}{8}''$.

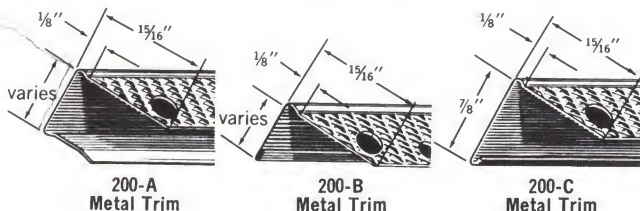
No. 900 Corner Bead is a galvanized steel external corner reinforcement with $1\frac{1}{4}''$ wide fine-mesh expanded flanges. Nailed or stapled to framing through wallboard; provides superior key for joint compounds and eliminates shadowing.

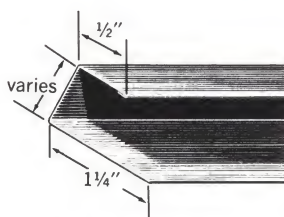


METAL TRIM

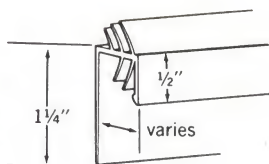
USG Metal Trims provide maximum protection and neat finished edges to gypsum wallboard at window and door jambs, at ceiling angles and at intersections where wallboard abuts other materials. Easily nailed through the channel and wallboard into the framing. Eliminates precision cutting and mitering with simply butted joints. Finished with U.S.G. joint compounds (except No. 400 series). Made in three types, ten sizes:

No. 200 series—steel casing, includes **No. 200-A** U-shaped channel in $\frac{1}{2}''$ and $\frac{5}{8}''$ sizes; **No. 200-B** L-shaped angle edge trim without back flange to simplify application, in $\frac{1}{2}''$ and $\frac{5}{8}''$ sizes; **No. 200-C** L-shaped trim, requires slotted jamb for in-





400 Series
USG Metal Trim

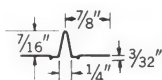


USG P-1
Vinyl Trim

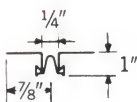
stallation in most cases, open "V" edge of flange inserts into kerf to make trim adjustable for use with $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{5}{8}$ " gypsum wallboard.

No. 400 series—reveal type all-metal trim, requires no finishing compound, includes **No. 400** in $\frac{3}{8}$ " size, **No. 401** in $\frac{1}{2}$ " size, **No. 402** in $\frac{5}{8}$ " size.

USG P-1 Vinyl Trim is a reveal type, white plastic trim with flanges and web of rigid vinyl and integral flexible vinyl fins that compress on installation. Fins form permanent flexible seal to effectively block sound, replace caulking, provide structural stress relief at wallboard perimeter. Fits tightly over wallboard edge; requires no finishing compound; paints easily; includes **P-1A** in $\frac{1}{2}$ " size, **P-1B** in $\frac{5}{8}$ " size.



USG Control Joint #093



USG Control Joint #100

CONTROL JOINTS

USG Control Joints are designed to relieve stresses of expansion and contraction transverse to the joint in large ceiling and wall areas. Made from roll-formed zinc with a $\frac{1}{4}$ " open slot that is protected with plastic tape which is removed after finishing. Highly resistant to corrosion in interior and exterior uses.

USG Control Joint No. 093—used for interior applications from floor to ceiling in long partitions and wall furring runs and from door header to ceiling or from wall to wall in large ceiling areas. Staple-applied to wallboard face; finished with joint compound.

USG Control Joint No. 100—used in Metal Stud Curtain Wall System to minimize cracking in exterior stucco surfaces.

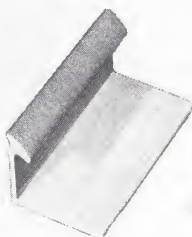
Table VI. Wallboard Trim Accessories Specifications

Product	Length	Pcs. per Ctn.	Lin. Ft. per Ctn.	Approx. Wt. Lbs./MLF
No. 100 PERF-A-BEAD (200' ctns.)	6' 8" 8'	30 25	200 200	55
No. 100 PERF-A-BEAD (1000' ctns.)	6' 8" 8'	150 125	1,000 1,000	55
No. 101 DUR-A-BEAD (200' ctns.) 1"x1" Flange	6' 8" 6'10" 8', 10'	30 30 25, 20	200 205 200	114
No. 101 DUR-A-BEAD (500' ctns.) 1"x1" Flange	6' 8" 6'10" 8' 10'	75 75 63 50	500 513 504 500	114
No. 103 DUR-A-BEAD 1¼"x1¼" Flange	8' 10'	63 50	504 500	147
ECONO STD. 1½"x1½" Flange	8'	63	504	100
ECONO No. 102—1¼"x1" Flange	8'	63	504	120
ECONO No. 103 1¼"x1¼" Flange	8' 10'	63 50	504 500	135
ECONO No. 104—1½"x1½" Flange	8'	63	504	120
No. 900 Corner Bead	8' 10'	60 60	480 600	90
No. 200-A ½" USG Metal Trim U-shaped	7' 8' 10'	50 50 50	350 400 500	108
No. 200-A ¾" USG Metal Trim U-shaped	7' 8' 10'	50 50 50	350 400 500	118
No. 200-B ½" USG Metal Trim L-shaped	7' 8' 10'	50 50 50	350 400 500	87
No. 200-B ¾" USG Metal Trim L-shaped	7' 8' 10'	50 50 50	350 400 500	94
No. 200-C USG Metal Trim L-shaped	7' 10'	50 50	350 500	106
No. 400 ¾" USG Metal Trim Reveal Type	7' 8' 9' 10'	50 50 50 50	350 400 450 500	149
No. 401 ½" USG Metal Trim Reveal Type	7' 8' 9' 10'	50 50 50 50	350 400 450 500	157
No. 402 ¾" USG Metal Trim Reveal Type	7' 8' 9' 10'	50 50 50 50	350 400 450 500	165
USG P-1A Vinyl Trim Reveal Type	8' 9' 10'	50 50 50	400 450 500	100
USG P-1B Vinyl Trim Reveal Type	8' 9' 10'	50 50 50	400 450 500	105
USG Control Joint #100	10'	25	250	216
#093	8'	30	240	116
#093	10'	25	250	116

TEXTONE MOLDINGS



AV-1
Outside
Corner



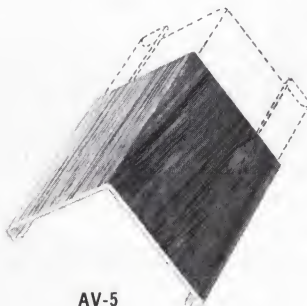
AV-2
Inside
Corner



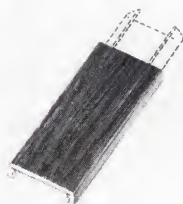
AV-3
Divider



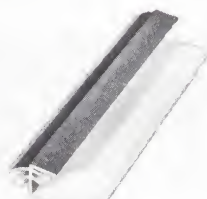
AV-4
End
Cap



AV-5
Snap-on
Corner



AV-7
Snap-on
Batten



PV-1
Rigid Vinyl
Trim

TEXTONE Moldings cover joints and protect corners, thus enhance beauty and durability of predecorated panel installations. Made of precision extruded aluminum in permanently bonded finishes to match finishes of $\frac{3}{8}$ " ULTRAWALL and $\frac{1}{2}$ " TEXTONE Standard Vinyl Panels; also available for $\frac{5}{8}$ " wallboard. Seven shapes—Divider, Inside Corner, Outside Corner, End Cap, 2-piece Snap-on Outside Corner, 2-piece Snap-on Batten, Rigid Vinyl Trim. Length: 8' and 10'; easily cut and mitered.

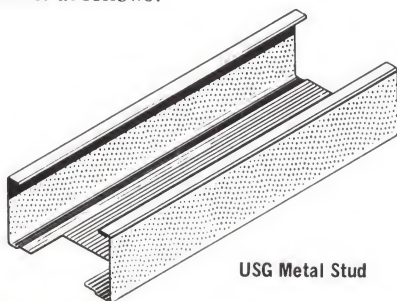
structural accessories

U.S.G. leads the industry in the development and acceptance of structural components for drywall systems. They offer the advantages of light weight, low material cost and quick erection, superior strength, and versatility in meeting job requirements. All are incombustible, made from cold rolled or galvanized steel or wire.

USG runners, metal base and base clips provide secure anchorage, alignment and installation economies for various drywall partitions and wall furring assemblies. Both runners and base clips are pre-punched for quick attachment. Also included are two non-load bearing studs of the channel type, complete with runner tracks and screws as needed; hat-shaped and U-shaped furring and resilient channels, and an adjustable wall furring bracket.

It is important that light-gauge metal components such as metal studs and runners, furring channels and resilient channels be given adequate protection in the warehouse or on the job site against rusting caused by moisture. In marine areas such as the Caribbean, Florida and the Gulf Coast where chloride as well as sea salt is present in combination with excessively high humidity, it is recommended that components be used which offer increased protection against corrosion.

USG Interior Metal Studs are non-load bearing channel type studs roll formed from galvanized steel, designed for screw attachment of $\frac{1}{2}$ " and $\frac{5}{8}$ " SHEETROCK Wallboard in USG Metal Stud Partitions and column fireproofing and as framing in drywall ceilings (see Chapter 4 for construction details). One end of each stud is notched (except the $1\frac{5}{8}$ " stud) and a punched hole is located about 12" from each end (24" from end in some parts of the country) to facilitate pipe and conduit installation—also available with keyhole cutouts in selected markets. Packaged: 10 pcs. per bdl.; available as follows:

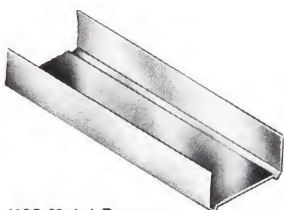


USG Metal Stud

Designation	Width	Length	Wt. Lbs./MLF
#158 Standard	$1\frac{5}{8}$ "	8, 9'	338
#212 Standard	$2\frac{1}{2}$ "	8', 9', 10', 12'	398
#358 Standard	$3\frac{5}{8}$ "	8', 9', 10', 12', 16'	475
#400 Standard	4"	8', 9', 10', 12', 16'	501
#600 Standard	6"	Up to 16'(1)	651

(1) Not stocked; made to order only.

44 products/metal studs & runners



USG Metal Runner



1 $\frac{3}{8}$ " x $\frac{7}{8}$ "—24 ga.
Metal Angle Runner

USG Metal Runners are roll-formed galvanized steel channel-type sections designed to receive USG Metal Studs and to secure various types of U.S.G. partitions to floor and ceiling. Runners are unhemmed, available with either a 1" or 1 $\frac{1}{4}$ " leg—the latter for use where metal snap-on base is attached to runners with clips. Length: 12'; packaged 10 pcs. per bdl., available as follows:

Designation	Width	Wt. Lbs./MLF
#158—1" leg	1 $\frac{5}{8}$ "	244
#212—1" leg	2 $\frac{1}{2}$ "	304
#358—1" leg	3 $\frac{5}{8}$ "	381
#400—1" leg	4"	407
#600(1)—1" leg	6"	582

(1) Not stocked; made to order only.

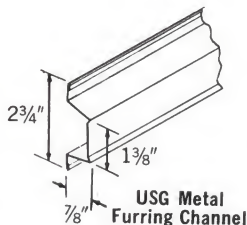
USG 20-ga. Metal Studs and Runners are strong non-load bearing components of USG exterior curtain wall systems. Gypsum sheathing on the outside, gypsum drywall or plaster base on the inside are screw attached to the channel-type studs, which are roll-formed from galvanized steel. Studs are screw attached to runners at top and bottom. Studs and runners are available in three widths—2 $\frac{1}{2}$ ", 3 $\frac{5}{8}$ " and 6"—studs in lengths up to 28'; runners (designed with 1" unhemmed leg) in 10' and 12' lengths. These items are not stocked; made to order only. For properties and limiting heights in exterior curtain walls, see Chapter 4.

Size	Width	Wt. Lbs./MLF	
		Stud	Runner
#212—20 ga.	2 $\frac{1}{2}$ "	767	655
#358—20 ga.	3 $\frac{5}{8}$ "	918	805
#600—20 ga.	6"	1,250	1,124

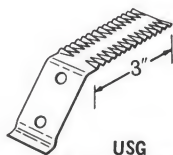
USG Metal Angle Runners are 1 $\frac{3}{8}$ "x $\frac{7}{8}$ "x24-ga. galvanized steel angle sections used to secure 1" coreboard at floor and ceiling in USG Solid, Double Solid and Triple Solid Partitions. Length: 10'; packaged: 10 pcs. per bdl.; weight: 217 lbs. per MLF.



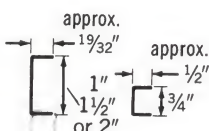
USG Metal Furring Channel Clip



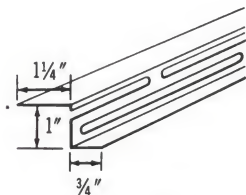
USG Metal Furring Channel



USG Adjustable Wall Furring Bracket



Cold Rolled Channels



USG Metal Z-Furring Channel

USG Z-Furring Channels are used to mechanically attach rigid foam insulation and SHEETROCK Wallboard to monolithic concrete and masonry walls. Made of galvanized steel; face width: 1 1/4"; furring depth 1"; length: 8'-6"; packaged: 25 pcs. per bdl; weight: 213 lbs./MLF.

USG Metal Furring Channels are ceiling and wall furring channels made of galvanized steel designed for attachment of 1/2" and 5/8" SHEETROCK Wallboard with USG Brand Hi-Lo Screws Type S. Face width: 1 3/8"; furring depth: 7/8", length: 12', packaged: 10 pcs. per bdl.; weight: 292 lbs. per MLF.

USG Furring Channel Clips are made of galvanized wire and used in attaching Metal Furring Channels to 1 1/2" cold-rolled runner channels. They are installed on alternate sides of the carrying channels; where clips cannot be alternated, wire tying is recommended. Packaged: 500 pcs. per ctn., weight: 36 lbs. per M pcs.

USG Cold-Rolled Channels, made of 16-ga. steel, are used for furring, and in suspended ceilings and partition construction. Available either galvanized or black asphaltum painted. Sizes: 3/4", with 1/2" flange; 1 1/2", with 19/32" flange; 2", with 19/32" flange. Lengths: 16' and 20'; packaged: 20 pcs. per bdl. 3/4" size, 10 pcs. per bdl. 1 1/2" and 2" size; weight: 3/4"-300 lbs. per M lin. ft., 1 1/2"-500 lbs./MLF, 2"-629 lbs./MLF.



RC-1 Resilient Channel

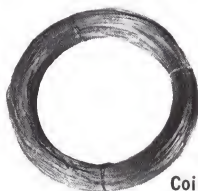
RC-1 SHEETROCK Resilient Channel is a galvanized steel channel which provides for resilient attachment of gypsum wall-board to wood framing. Widely used to improve sound transmission loss in partitions and ceilings of garden-type apartments, motels and other structures. Prepunched holes 4" o.c. in the flange facilitate screw fastening to framing members; SHEETROCK is attached to channel by USG Brand Hi-Lo Screws Type S. Width: 2 3/4"; depth: 1 1/2"; length: 12'; packaged: 20 pcs. per bdl.; weight: 220 lbs. per MLF. *Limitation:* must not be installed beneath highly flexible wood floor joists. RC-1 Channels are attached to ceilings with 1 1/4" USG Brand Screws Type W or S—nails must not be used; see Wood Framing Requirements Chapter 3.



Hank Wire



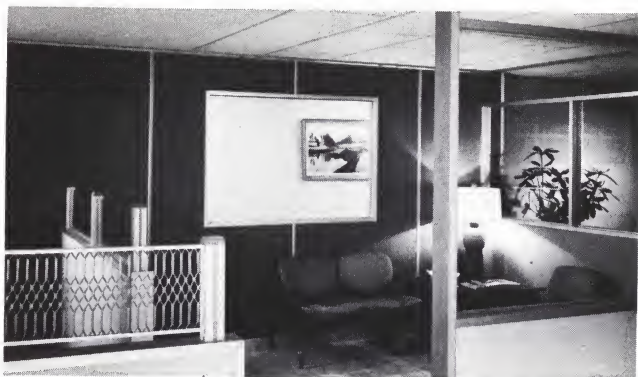
Furring Bracket



Coil Wire

USG Adjustable Wall Furring Brackets are used for attaching 3/4" furring channels and Metal Furring Channels to exterior masonry walls. Made of 20-ga. galvanized steel with serrated edges, they are wire-tied to horizontal stiffeners, 24" o.c., in braced furring systems: fur out board 1/4" to 2 1/4" plus channel depth. Packaged: 500 pcs. per ctn., weight 52 lbs. per M pcs.

USG Galvanized Tie and Hanger Wire—9-ga. wire, for hanging 1 1/2" and 2" runner channels in suspended ceilings is available in 50 lb. coils. 16-ga. and 18-ga. soft annealed wire, used for wall furring to tie furring channels to runner channels in ceiling construction, is available in 50-lb. coils and 25-lb. hanks (28" straight lengths).



demountable partition components

A full line of specially designed accessories and trim, made from corrosion-resistant aluminum, steel and plastic, is available for the exclusive USG Demountable Partition Systems. These simplified, coordinated components offer complete flexibility in use with virtual 100% reusability in movable partitions of ceiling, cornice and bank rail height.

Individual wall sections are erected from 2½" interior metal studs set in metal runners and faced with ½" TEXTONE vinyl-faced panels or regular SHEETROCK Wallboard, 4' wide.

Panel joints are concealed with anodized aluminum battens and corners having decorative plastic inserts or snap-on moldings with permanently bonded finishes to match TEXTONE Standard Panels. Either recessed-flush type or thin-reveal type base made from anodized aluminum or high impact black vinyl plastic may be used. Several types of aluminum wall-ceiling trim including picture molding are available.

Aluminum accessories for trimming 1¾" doors are furnished in plain straight lengths, in sets of two jamb sections for full height doors or in sets of two jamb sections and one header section pre-punched for right hand or left hand opening 3'x6'8" and 3'x7'0" doors.

Glazing posts, glazing rails and covers, and other glazing accessories are available for use with 7/32" and ¼" thick glass.

Where a fire rating is not required, an alternate labor-saving construction is available using the following one-piece, multi-function aluminum components: H-Stud and Trim, Interior-Exterior Corner, Recessed Ceiling Runner and Trim.

Aluminum components are extruded sections with a satin finish and a corrosion-resistant natural anodized coating. Steel parts are all galvanized to resist corrosion and minimize galvanic action with aluminum. Plastic components are compression molded or extruded from high impact vinyl plastic except batten inserts and glazing spline which are flexible extruded polyethylene plastic.



sound control and insulation products

Adequate sound control is one of the fastest growing requirements in today's buildings. The public has become sufficiently "noise-conscious" to demand effective measures to control unwanted sound in both commercial and residential construction. With its advanced research, U.S.G. has been a leader in developing new systems and products for efficient, low-cost sound control for all types of new construction and remodeling.

THERMAFIBER Sound Attenuation Blankets are paperless, semi-rigid mineral fiber blankets of uniform dimension and controlled density especially developed for efficient sound barrier use. When inserted in the partition cavity from floor to ceiling, these blankets help provide excellent fire ratings and substantially improve STC ratings of partitions. Easily handled and cut; simple to install. Fire hazard classification: flame spread 25, fuel contributed 20, smoke developed 0. Blankets meet Fed. Spec. HH-I-521-D Type 1. Thickness: 1", 1½", 2"; width: 16" and 24"; length: 48".

THERMAFIBER Sound Control (Regular) Blankets consist of mineral fibers mechanically formed into a uniform mat of definite dimension and controlled density. One side is enclosed with a strong asphalted paper which also forms nailing flanges. The breather side is enclosed in a durable fire-resistant, porous kraft paper; open faced batts are available if required.

Used in wood framed partitions, ceilings and floors for improved sound resistance and insulation. Blankets meet Fed. Spec. HH-I-521-D Type 1. Thickness: 2" and 3"; width: 15", 19", 23"; length: 4', 8', 24'.

USG Wood Fiber Sound Deadening Board, a ½" thick, 4' wide, low-density board, is used behind gypsum wallboard to reduce sound transmission through a partition (see Chapter 5 for technical data). This structural board is easily nailed to 2x4 wood studs and provides a resilient base for the application of wallboard. Limited to interior uses only. Gypsum board face layer must be permanently nailed. Not recommended as a base layer in radiant heated ceilings. Lengths: 4', 8', 10' and 12', packaged: 6 pcs. per bdl., weight: 750 lbs. per M sq. ft.

USG Mineral Fiber Sound Deadening Board is a $\frac{1}{2}$ " thick, 4' wide incombustible rigid type board used behind gypsum wall-board to reduce sound transmission through a USG Metal Stud partition. Lengths: 8' and 9', packaged: 6 pcs. per bdl., weight 1030 lbs. per M sq. ft.

THERMAFIBER M-S Blankets are specially designed for insulating exterior furring and curtain wall assemblies which utilize metal studs. They are flangeless, open-faced on breather side and made slightly wider than normal to give snug friction fit between studs. Require a separate vapor barrier such as Insulating SHEETROCK or a 4 mil polyethylene film. Blankets meet Fed. Spec. HH-I-521-C Type 1 Class B. Thickness: 2", 3", $3\frac{5}{8}$ "; width: 16" and 24"; length: 48" and 96".

Plastic Foam Insulations are low density, self-extinguishing rigid boards having high strength and good resistance to water and water vapor. Used in drywall exterior wall furring systems, they are bonded directly to masonry surfaces and provide an excellent base for SHEETROCK Wallboard. Boards are lightweight, non-flaking, non-irritating; easily handled and installed. Manufactured by Dow Chemical Company. Available in four types:

STYROFOAM® SM and **STYROFOAM FR**, extruded polystyrene; **DORVON® FR-100**, molded expanded polystyrene; **THURANE®** urethane rigid foam insulation. Physical properties and specifications:

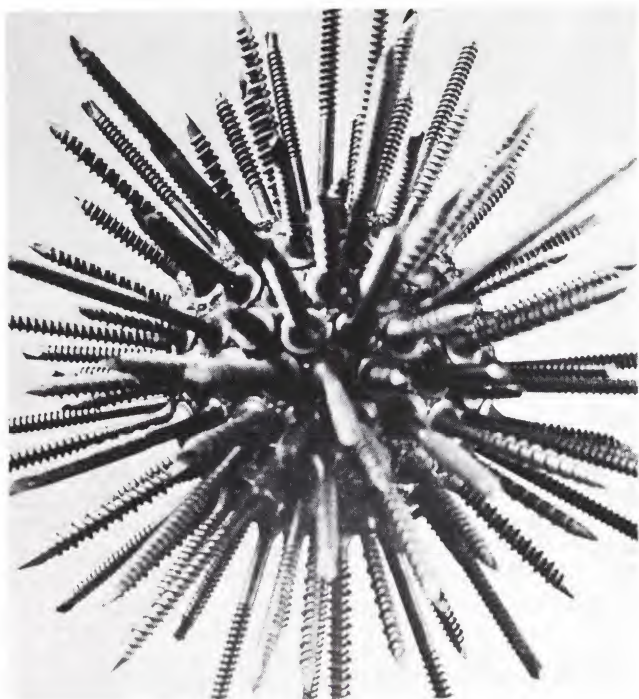
Table VII—Plastic Foam Insulation—Specifications

	STYROFOAM SM	STYRO-FOAM FR	DORVON FR-100	THURANE
Density—pcf	2.2	1.8	1.0	1.9
Water Vapor Transmission—perm-inch	0.60	1.0	3.0	1.5
Thermal Conductivity—"k"(1)	0.20	0.26	0.26	0.15
Thickness—in.(2)	$\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, 2	1, $1\frac{1}{2}$, 2	1, $1\frac{1}{2}$, 2	$\frac{3}{4}$, 1, $1\frac{1}{2}$, 2
Width—in.	24	16 24	16, 24, 48	16, 24, 48
Length—ft.	8	9 8	8	4, 8, 9

(1) Btu-in./sq. ft.—hr. °F. at 75° average mean temperature.

(2) Greater thicknesses are available.

Sealants—USG Acoustical Sealant is a resilient non-hardening, non-skinning compound used to improve acoustical performance of drywall construction. It is applied around cut-outs, under runners and around the perimeter of partitions and ceilings to prevent leaks and transmission of airborne sound. Caulking should have flexibility to absorb slight movement and maintain an airtight seal without adhesive failure. It needs to be long-lasting, non-staining, non-bleeding and easily applied with mechanical or pneumatic caulking apparatus.



fasteners and adhesives

USG Brand Screws are the result of many years of development aimed at producing the best possible attachment of SHEETROCK Wallboard to steel, wood or gypsum supports simply and quickly. A complete line of 22 different special, self-drilling, self-tapping steel screws have been made available to improve construction systems and simplify installation methods. All dry-wall screws are highly corrosion resistant and have a Phillips head recess for easy installation with a special bit and power-driven screw driver. Wallboard is fastened to: 25-ga. (max.) steel framing with Type S screws, 12-ga. (max.) steel framing with Type S-12 screws, wood framing with Type W screws, gypsum studs and coreboards with Type G screws and adhesive.

The special patented bugle head used when attaching wallboard spins the face paper into the cavity under the screw head and produces a uniform depression free of fuzz for proper and easier spotting. Defects due to excessive or improper nail dimpling are eliminated. Other head designs are available for the assembly of metal framing and installation of wood and metal trim.

Type S screws have a patented milled drilling point and special Hi-Lo threads that provide greater holding power, 35% to 50% faster penetration with 40% less driving torque than conventional drywall screws. These factors mean more screws can be driven

per day and screw guns last longer. Special threads are also provided on Type G and Type W screws to speed installation and provide excellent holding power in gypsum or the varied woods used in framing.

The ability of drywall screws to pull the gypsum wallboard tightly to the framing without damaging the board has virtually eliminated loose board attachment and consequent problems of "fastener pops" in wood frame construction. Fewer screws than nails are generally required. Speed of installation compares favorably with nailing when electric screw guns (see Chapter 7) are used. An adjustable screw depth control assures uniformity of penetration, protects the face paper, minimizes core fracturing.



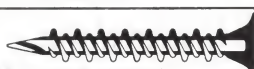
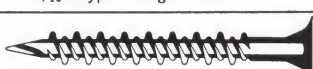
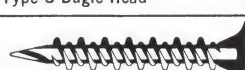
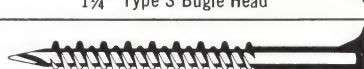
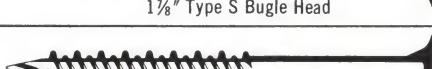
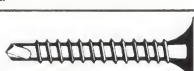
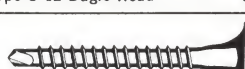
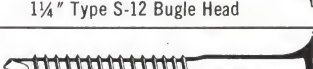
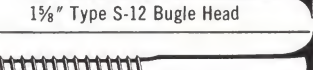
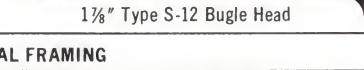


Although "fastener pops" caused by loose wallboard are eliminated, screws will not prevent "pops" due to excessive wood shrinkage or warping and twisting of framing. Correct selection and proper use of the screw recommended for the specific application is most important. Regardless of the attachment method used satisfactory results also depend on meeting proper framing, heating and ventilating requirements (see Chapter 1).

Table VIII—USG Brand Screw Specifications





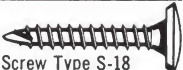





Description			Packaging				
			#1 Bulk with Bits			#3 Packages†	
Length	Type	Head	M qty.	Lbs. wt.	No. of bits	M qty.	Lbs. wt.
Base Screws							
7/8"	S	Bugle	24	72	2	3	8 2/3
1"	S	Bugle	16	53	2	2	6
1 1/8"	S	Bugle	16	57	2	2	7
1 1/4"	S	Bugle	16	61	2	2	7 1/2
1 5/16"	S	Bugle	16	66	2	2	7
1 3/8"	S	Bugle	8	44 1/2	2	1	5 1/2
1 7/8"	S	Bugle	8	47 1/2	2	2	12*
2 1/4"	S	Bugle	4	30	2	1	7 1/2*
Specialty Screws							
1 5/8"	S	Trim	8	36	4	2**	9*
2 1/4"	S	Trim	8	53	4	2**	13*
3/8"	S	Pan	24	54	2	5	11*
3/8"	S-12	Pan	24	54	2	5	11*
1/2"	S-12	Pan	12	40	2	3	10*
1/2"	S-16	Pan(1)	—	—	—	3	10
1"	S-12	Bugle	16	52	2	2	6 1/2
1 1/4"	S-12	Bugle	16	61	2	2	7 1/2
1 3/8"	S-12	Bugle	8	44	2	1	5 1/2
1 7/8"	S-12	Bugle	8	47	2	2	12*
1 1/4"	W	Bugle	16	60	2	2	8 1/3
1 1/2"	G	Bugle	8	45	2	2	11*
Finishing Screws							
7/8"	S-18	Oval(1)	16	64	2	2**	8
1 1/4"	S	Bugle(1)	16	61	2	1	4

(1) Cadmium Plated. †Also available in No. 2 Master Cartons, 4 or 8 pkgs. per ctn., same no. bits as in bulk. **Includes 1 bit per 2M screws. Single asterisks denote screws supplied in 4 pkgs. per Master Carton.

SELECTOR GUIDE FOR USG BRAND SCREWS

Fastening Application	Fastener Used
GYPSUM BOARD TO INTERIOR METAL FRAMING (1)	
½" single layer wallboard to interior studs, runners, channels	⅞" Type S Bugle Head 
⅝" single layer wallboard to interior studs, runners, channels	1" Type S Bugle Head 
½" double layer wallboard to interior studs, runners, channels	1⅝" Type S Bugle Head 
⅝" double layer wallboard to interior studs, runners, channels	1⅞" Type S Bugle Head 
1" coreboard to metal angle runners in solid partitions	1¼" Type S Bugle Head 
½" wallboard through coreboard to metal angle runners in solid partitions	1⅞" Type S Bugle Head 
⅝" wallboard through coreboard to metal angle runners in solid partitions	2¼" Type S Bugle Head 
GYPSUM BOARD TO 12-GA. (MAX.) METAL FRAMING	
½" and ⅝" wallboard and gypsum sheathing to 20-ga. studs and runners	1" Type S-12 Bugle Head 
USG Self-Furring Metal Lath through gypsum sheathing to 20-ga. studs and runners	1¼" Type S-12 Bugle Head 
E-Z WALL Panels to studs and runners	1⅝" Type S-12 Bugle Head 
½" and ⅝" double layer gypsum wallboard to 20-ga. studs and runners	1⅞" Type S-12 Bugle Head 
Multi-layer gypsum board to 20-ga. studs and runners	1⅞" Type S-12 Bugle Head 
WOOD TRIM TO INTERIOR METAL FRAMING	
Wood trim over single layer wallboard to interior studs, runners	1⅝" Type S Trim Head 
Wood trim over double layer wallboard to interior studs, runners	2¼" Type S Trim Head 

SELECTOR GUIDE FOR USG BRAND SCREWS




Fastening Application	Fastener Used
METAL STUDS TO DOOR FRAMES, RUNNERS	
Interior metal studs to runners	$\frac{3}{8}$ " Type S Pan Head 
Interior metal studs to door frame jamb anchor clips 20-ga. studs to runner Other metal-to-metal attachment (12-ga. max.)	$\frac{3}{8}$ " Type S-12 Pan Head 
Interior metal studs to door frame jamb anchor clips (heavier shank assures entry in clips of hard steel)	$\frac{1}{2}$ " Type S-12 Pan Head 
Strut studs to door frame clips, rails and other attachments in E-Z WALL partitions	$\frac{1}{2}$ " Type S-16 Pan Head Cadmium Plated 
TRIM AND ACCESSORIES TO METAL FRAMING	
Door hinges and trim to door frame Aluminum trim to metal framing (screw matches hardware and trim)	$\frac{7}{8}$ " Finishing Screw Type S-18 Oval Head Cadmium Plated 
Metal base splice plates through wallboard and runner	$1\frac{1}{4}$ " Type S Bugle Head 
Batten strips to interior metal studs in demountable partitions	$1\frac{1}{8}$ " Type S Bugle Head 
Aluminum trim to interior metal framing in Demountable and E-Z WALL partitions	$1\frac{1}{4}$ " Finishing Screw Type S Bugle Head Cadmium Plated 
GYPSUM BOARD TO WOOD FRAMING	
$\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{5}{8}$ " single layer wallboard to wood framing	$1\frac{1}{4}$ " Type W Bugle Head 
RC-1 RESILIENT CHANNEL TO WOOD FRAMING	
Screw attachment required for ceilings, recommended for partitions	$1\frac{1}{4}$ " Type W, $\frac{7}{8}$ " or 1" Type S Bugle Head (see details above)
For fire rated construction	$1\frac{1}{4}$ " Type S Bugle Head (see details above)
GYPSUM BOARD TO GYPSUM BOARD	
Multi-layer adhesively laminated gypsum to gypsum partitions (not recommended for double layer $\frac{3}{8}$ " wallboard)	$1\frac{1}{2}$ " Type G Bugle Head 









Notes: (1) Includes USG Interior Studs, Metal Runners, Metal Angle Runners, Metal Furring Channels, RC-1 Resilient Channels. If channel resiliency makes screw penetration difficult, use screws $\frac{1}{8}$ " longer than shown to attach wallboard to RC-1 channels. For 20-ga. Metal Studs and Runners, always use Type S-12 screws. For steel applications not shown, select a screw length which is at least $\frac{3}{8}$ " longer than total thickness of materials to be fastened. USG Brand Screws are manufactured under U.S. Patent Nos. 2,871,752; 3,056,234; 3,125,923; 3,207,023; 3,221,588.

Wallboard Nails have been vastly improved since the relationship of wood shrinkage to nail popping was discovered. Nails have been developed to concentrate maximum holding power over the shortest possible length—notably the annular ring type nail which has about 20% greater holding power than a cement-coated cooler type nail of the same length. However, under lengthy, extreme drying conditions, such as a cold dry winter, resulting wood shrinkage may cause fastener pops even with the annular ring nail (see Wood Shrinkage, Chapter 6).

As with screws, specification of the proper nail for each application is extremely important, particularly for fire-rated construction. Nails used in drywall construction should comply with performance standards adopted by the Gypsum Drywall Contractors International Gypsum Association and ASTM Specifications C380 or C514. The nails shown below comply with these performance standards. Nails, except USG Matching Color Nails, are not available from U.S.G.

SELECTOR GUIDE FOR WALLBOARD NAILS

Fastening Applications	Fastener Description	Nail Spacing C. to C. (1)	Approx. Lbs. Nails Req'd per MSF SHEETROCK
$\frac{1}{2}$ " $\frac{3}{8}$ " and $\frac{1}{4}$ " SHEETROCK Wallboard; $\frac{1}{2}$ " and $\frac{3}{8}$ " BXBORD Gypsum Backing Board to wood frame (2) (3)	1 $\frac{1}{4}$ " GWB-54 Annular Ring Nail 12 $\frac{1}{2}$ ga.; $\frac{1}{4}$ " dia. head with a slight taper to a small fillet at shank; bright finish; medium diamond point; meets ASTM C380 	7" ceiling 8" walls	5 $\frac{1}{4}$
$\frac{5}{8}$ " SHEETROCK Wallboard to wood frame (3)	1 $\frac{3}{8}$ " Annular Ring Nail (Same as GWB-54 except for length) 	7" ceiling 8" walls	5 $\frac{1}{4}$
$\frac{5}{8}$ " SHEETROCK FIRECODE Wallboard face layers to staggered wood studs over $\frac{1}{2}$ " USG Wood Fiber Sound Deadening Board	2 $\frac{1}{4}$ " 7d Gypsum Wallboard Nail Cement Coated, 13 ga., $\frac{1}{4}$ " dia. head 	7" walls (face layer)	9

3/8" and 1/4" SHEETROCK Wallboard over existing surface, wood frame	1 1/8" 6d Gypsum Wallboard Nail Cement Coated, 13 ga., 1/4" dia. head		7" ceiling 8" walls	6 1/4
5/8" SHEETROCK FIRECODE Wallboard to wood frame	1 1/8" 6d Gypsum Wallboard Nail Cement Coated, 13 ga., 1/4" dia. head		6" ceiling 7" walls	6 3/4
1/2" SHEETROCK FIRECODE "C" Wallboard to wood frame	1 5/8" 5d Gypsum Wallboard Nail Cement Coated, 13 1/2 ga., 15/64" dia. head		6" ceiling 7" walls	5 1/4
3/8" ULTRAWALL Panels —to wood frame (3) —over existing surface, wood frame (3)	1 1/8" USG Matching Color Nail (Steel)		8" walls	1 1/2
	1 7/8" USG Matching Color Nail (Steel)		8" walls	4 1/2
5/8" SHEETROCK FIRECODE Wallboard; 5/8" BAXBORD FIRECODE Gypsum Backing Board to steel nailing channel	1 1/4" Fetter Annular Ring Nail 11 ga., 5/16" dia. head		6" ceiling	6
TEXTONE Vinyl Panels (17 finishes) to wood frame (3)	1 3/8" USG Matching Color Nail (Brass)		8" walls	2 1/2
	1 7/8" USG Matching Color Nail (Brass) (Special Order)		8" walls	4 1/2

NOTES: (1) Spacing shown are for single layer application without adhesive. (2) See Wood Framing Requirements and Heating Recommendations, Chapter 1. (3) Nails shown for this application are also the proper size for use with adhesive.

USG Drywall Adhesives make an important contribution to wallboard attachment where the finest room interiors are desired. Their use greatly reduces the nail or screw fastening otherwise required, thus saves labor on spotting and sanding—also minimizes nail pops and joint ridging.

PERF-A-TAPE Joint Compound-Taping is recommended for laminating gypsum wallboard to gypsum backing board in multi-layer partitions and ceilings. It is a dry powder product, applied by spreader, requiring mixing and temporary fastening in application; qualifies for fire-rated construction.

Newly developed, ready-to-use, **DURABOND Adhesives** are available in five types for specific applications:

DURABOND 200 Stud Adhesive—a solvent-base material, applied in $\frac{3}{8}$ " beads, for wallboard application to wood or metal framing. May be used with Insulating (foil-backed) **SHEETROCK Wallboard**. Bridges minor framing irregularities; requires minimum field fasteners on ceilings; meets ASTM C557 67.

DURABOND 300 Stud Adhesive—a water-base material, applied in beads, for wallboard application to wood and metal framing and polystyrene rigid foam insulation. Requires a minimum of temporary fasteners in field of board. May be used with Insulating (foil-backed) **SHEETROCK Wallboard**. Meets ASTM C557 67. Protect from freezing.

DURABOND 400 Paneling Adhesive—a water-base material, for application of prefinished wall paneling to wood or metal framing or existing wall surfaces. Applied in $\frac{3}{8}$ " beads. Long "tack" period allows board adjustment after erection. Provides tight bond when impacted; requires no field fasteners. Protect from freezing.

DURABOND 500 Mastic Contact Adhesive—a water-base adhesive for laminating gypsum wallboard and backing boards to monolithic concrete, concrete block, wood fiber sound deadening board, expanded polystyrene or urethane rigid foam insulation and existing wall surfaces in non-fire rated construction. Strips applied with an Ames spreader, or notched metal spreader having four $\frac{1}{4}$ "x $\frac{1}{4}$ " minimum notches spaced no more than 2" o.c. Allows board adjustment after erection; provides excellent bond after impacting. Field fasteners not required when panels are prebowed. Protect from freezing.

DURABOND 600 Liquid Contact Adhesive—a water-base adhesive for laminating gypsum wallboard in non-fire rated double layer systems. Spray or roller applied. Bonds tightly with impacting. Ceiling lamination only requires a minimum of permanent fasteners. Protect from freezing.

NOTE: Because of the potential incompatibility between vinyl-surfaced wallboard and solvent-based adhesives, United States Gypsum cannot be responsible for problems arising from the use of either its adhesives with vinyl-surfaced wallboard manufactured by others, or its vinyl-surfaced wallboard applied with adhesives made by others.

Table IX. USG Adhesive Specifications

Type Adhesive	Item	Items per Package	Gross Wt. Lbs./Pkg.
PERF-A-TAPE Joint Compound— taping	25 lb. bag	1 bag	25½
DURABOND 200	5 gal. can ¼ gal. ctdgs.	1 can 12/ctn.	50 32
DURABOND 300	5 gal. can ¼ gal. ctdgs.	1 can 12/ctn.	47 32
DURABOND 400	5 gal. can 1/10 gal. ctdgs. ¼ gal. ctdgs.	1 can 24/ctn. 12/ctn.	52 23 32
DURABOND 500	5 gal. can	1 can	41
DURABOND 600	5 gal. can	1 can	44

Selector Guide For Drywall Adhesives

Application & Description	Features
SHEETROCK Wallboard to BAXBORD Gypsum Backing Board or SHEETROCK base layer PERF-A-TAPE Joint Compound— Taping—mixed with water, applied with spreading tool	Tight bond; permits adjustment of boards after contact; temporary fastening required; qualifies for fire-rated construction
SHEETROCK Wallboard to USG Sound Deadening Board PERF-A-TAPE Joint Compound— Taping—mixed with water, applied with spreading tool	Excellent bond; supplemental fastening required
SHEETROCK Wallboard or TEXTONE Gypsum Panels to wood or metal framing DURABOND 200† or 300, 400 applied with cartridge gun in continuous ⅜" beads	50% to 100% greater bond strength than with conventional fastenings. Eliminates all field nails on walls; all but one temporary fastener per framing member on ceilings
SHEETROCK Wallboard or TEXTONE Panels to SHEETROCK base layer, wood studs DURABOND 600, 500, 200, 300 To SHEETROCK or wood- or mineral-fiber board, wood or metal studs DURABOND 500, 200, 300	Bonds tightly with impact. On walls, fasteners are spaced 16" o.c. at top and bottom as required. Ceiling lamination requires permanent fasteners at each corner, 48" o.c. at edges. Impacted at 16" intervals
SHEETROCK Wallboard or rigid foam insulation to masonry or concrete; SHEETROCK to rigid foam base. Also for solid and semi-solid systems DURABOND 500, 200, 300	Allows wallboard adjustment after erection. Provides excellent bond after impacting

†Bold numbers show recommended adhesives; other numbers show suitable substitutes.



joint treatment products

DESCRIPTION

Today's complete U.S.G. joint treatment line includes both ready-mixed and powder-type joint compounds, fiber reinforcing tape suitable for application by either hand tools or mechanical taping tools. In addition to conventional joint finishing and fastener spotting, certain of these products are designed for repairing cracks, patching, spackling, back-blocking, and for laminating layers in gypsum wallboard double-layer systems.

A complete new group of non-casein type powder compounds—known as **USG Brand Joint Compounds**—has been added to the previous two lines of powder products. The new formulations are ready for use as soon as mixed, compared to the 30-minute or longer soak of casein type compounds, are stable in wet mix consistency, have smoother application properties and are free of ammonia odor.

The two established powder product lines are the casein type **PERF-A-TAPE Joint Compounds**, still the industry's standard of excellence, and **DURABOND Joint Compounds** designed for quick hardening and one-day finishing. In these powder lines, USG Brand and PERF-A-TAPE Compounds are offered in taping, topping and all-purpose type formulations, DURABOND in taping and multi-purpose.

All products are manufactured to meet ASTM Standard C-474-64 and C-475-64 and Federal Specification SS-J-570A Type I for joint compounds only, Type II for tape only, Type III for combined joint compound and tape.

ADVANTAGES

In U.S.G. joint compounds, these qualities of superiority have been developed:

Excellent Bond—holds tight under normal conditions.

Smoother Joints—joints harden out flatter; low shrinkage and tight cohesion reduce sanding to minimum; allow faster preparation for decorating.

Smooth Working—easy mixing, excellent slip, ample wet mix life; no alkali burning of paint.

In PERF-A-TAPE Reinforcement, both comparative tests and long field usage have established these performance advantages:

Strength—greatest cross tensile strength, producing joints as strong as the board itself.

Crack Resistance—chamfered edges are wafer-thin for easy embedding, greater holding power to resist edge cracking.

Natural Bond—tape truly adheres to compound; spark perforations minimizes photographing; tape has least longitudinal stretch; is pre-creased for easier folding.

Use of U.S.G. joint treatment brings the important added advantage of dealing with a single manufacturer who is responsible for *all* components of the finished wall or ceiling—all made by U.S.G. to *work together*.

GENERAL LIMITATIONS

1. For interior use only; not intended for use on wood or wood fiber products (except in certain lamination applications—see PERF-A-TAPE Joint Compound below).
2. Bagged products require protection against moisture.
3. Each compound coat must be dry before next is applied. Completed joint treatment must be thoroughly dry before proceeding with decoration.

PERF-A-TAPE Reinforcement is a strong fiber tape specially designed with chamfered edges feathered thin. Special cross-fibered paper has great strength both with and across the grain of paper. Many small random perforations allow rapid air escape during embedding. Highly crack resistant. Lightly pre-creased for corner application. Available in 60', 250', 600' rolls.

USG BRAND JOINT COMPOUNDS

These non-phosphoprotein (non-casein type) powder compounds possess virtually all the desirable features of conventional casein-bound products, but in addition provide greater stability of wet mix consistency and savings in mixing time. Not compatible with PERF-A-TAPE Joint Compounds, but they may be used over DURABOND and USG Ready-Mixed Joint Compounds.



USG Joint Compound-Taping is designed for embedding tape and for first fill coat on metal beads, trim and fasteners; also used for patching plaster cracks. Outstanding bond and resistance to tape cracking.

USG Joint Compound-Topping is a smooth-sanding material for second and third coats over taping compound. Produces excellent feathering and superior finishing results.

USG Joint Compound-All Purpose incorporates good taping and topping characteristics in single product, for use where finest results of the specialized compounds (above) are not necessary. Also has good texturing properties.

PERF-A-TAPE JOINT COMPOUNDS

These are the phosphoprotein (casein type) powder products which have long predominated in the marketplace. They are noted for qualities of easy mixing, smooth working, ample working time, controlled minimum shrinkage and no alkali burning of paint. They should not be used in combination with non-casein or hardening type joint compounds.

PERF-A-TAPE Joint Compound-Taping gives outstanding service in embedding tape, and as first fill coat over metal corners, trim and fasteners. Also used for patching plaster cracks, for laminating double-layer wallboard and in U.S.G. Back-Blocking System (see Chapter 3).

PERF-A-TAPE Joint Compound-Topping, used for finishing over PERF-A-TAPE Compound-Taping, is preferred for its workability, smoothness, paintability and long working life. Available either pigmented or unpigmented.

PERF-A-TAPE Joint Compound-All Purpose brings the convenience of single-package joint treatment; does an adequate job of embedding, topping, texturing, spray coating and skim coating.

DURABOND JOINT COMPOUNDS

These powder products were developed to cut drying time and provide faster finishing of drywall interiors, even under slow drying conditions. Rapid hardening and low shrinkage permit same-day finishing and usually next-day decoration. Superior bond is another outstanding feature. They are not compatible with casein-type compounds.

DURABOND Joint Compound-Taping is a polyindurate type material for embedding tape and metal accessories; also ideal for heavy fills because it chemically hardens in 3 to 6 hours. Virtually unaffected by high humidity and changes in humidity. *Limitation:* not to be used as finishing coat; must always be completely covered with final application of USG Joint Compound-Topping or All Purpose, or USG Ready-Mixed Joint Compound-All Purpose.

DURABOND 90 Joint Compound-Multi-Purpose is the required prefill material for SHEETROCK SW rounded-edge wall-board, creating the strongest joints ever developed. Its 1 to 2-hour hardening time also makes it an ideal alternate to DURABOND Joint Compound-Taping in applications where quicker finishing and minimum shrinkage are desired. A polyindurate type material.

READY-MIXED COMPOUNDS

USG Ready-Mixed Joint Compound-All Purpose, a vinyl-base formulation widely used for embedding and finishing, comes pre-mixed with a creamy, lump-free plasticity that produces excellent slip and bond. Available in either machine or hand tool consistency; on-the-wall cost averages the same as with powder compounds. Recommended for finishing SHEETROCK SW Wall-board joints over DURABOND 90 pre-fill coat; also used in repairing plaster cracks in interior plaster and masonry not subject to moisture. *Limitations:* container must be protected from freezing; not recommended for laminating.

COVER COAT Drywall Compound is a vinyl-base product, designed for filling and smoothing monolithic concrete ceilings and columns located above grade—no extra bonding agents needed. Supplied in ready-mixed form (sand can be added), easily applied with drywall tools in two or more coats. Dries to a fine white surface usually making further decoration unnecessary—if desired, COVER COAT is followed with SHEETROCK Sealer or TEXOLITE Primer-Sealer. *Limitations:* not to be applied over moist surfaces or surfaces likely to become moist (by condensation or otherwise), on ceiling areas below grade, on surfaces which project outside the building, or on other areas which might be subject to moisture, freezing, efflorescence, pitting or popping.

Table X. Joint Treatment Product Specifications

Product Description	Items per Package	Gross Wt. Lbs./Pkg.
PERF-A-TAPE Reinforcing Tape		
—500' roll	10/ctn.	28
—250' roll	20/ctn.	28½
—60' roll	24/ctn.	10
USG Brand Joint Compound (powder)— 25 lb. bag		
—taping, topping or all-purpose	1	25½
PERF-A-TAPE Joint Compound (powder)— 25-lb. bag	1	25½
—taping, topping or all-purpose		
—taping compound also in 5-lb. box	10/ctn.	55
DURABOND Joint Compound (powder)— 25-lb. bag	1	25½
—taping, topping or multi-purpose		
USG Ready-Mixed Joint Compound— All Purpose (paste)		
—5-gal. can	1	67
—4-gal. corrugated carton	1	53
—5-gal. corrugated carton	1	65
—5-gal. plastic pail	1	68
—1-gal. can	4/ctn.	58
COVER COAT Compound (paste)— 5-gal. corrugated carton	1	68
USG Ready-Mixed Joint System —100' tape, 1 gal. compound(1) in container	2/ctn.	30
PERF-A-TAPE Joint System —250' tape, 18 lb. compound(1) in bag	1	20
—60' tape, 4½ lb. compound(1) in box(2)	10/ctn.	55

(1) All Purpose Compound

(2) Furnished with or without 1 plastic knife per box.

interior texture finishes

U.S.G., the unchallenged leader in texture finishes, offers the industry's broadest line. These outstanding paste and powder products are leading the resurgence of interior decoration.

USG Texture I—a ready-to-use latex emulsion paint embodying a fine aggregate to produce a slight sand-finish effect combined with light texture. One coat covers fine cracks, blemishes. Quick-drying, 7 ready-mixed colors.

USG Texture II—flat ripple finish in a latex emulsion. Contains no sharp aggregate, can produce fine textures ranging from "orange-peel" effect to smooth rounded stipple. Conceals moderate imperfections, normally requires no sealer. Quick-drying, washable, recoatable. 7 ready-mixed colors.

Other paste textures available: **USG Texture VII**, sanded latex drywall surfacer; **USG Texture VIII**, drywall spray surfacer; **USG Texture IX**, heavy-bodied latex; **USG Texture XI**, latex paste stipple; **USG Sanded Paste Stipple**, alkyd resin compound.

IMPERIAL QT Texture Finish—aggregated powder, produces acoustical finish appearance on ceilings; provides no acoustical correction. Excellent bonding qualities; helps conceal surface defects. Spray-applied in coarse, medium or fine texture. White only. First coat of Pro-Kyd Alkyd Flat Wall Paint recommended.

TEXTONE Paint—the king of textures, especially adapted to heavy stipples, deep textures and a wide range of applications. For hand application; insoluble and durable. Useful for refinishing wallboard surfaces, producing stone or antique effects, stencil work; unequalled for concealing wall blemishes. White only, but can be tinted with TEXOLITE Standard or coated with most paints.

Other powder textures include **USG Texture Paint**, for medium heavy to medium light stipples; **A-B TEX Texture Paint** and **USG Spray Texture** for fog coats, light stipples and orange-peel textures; **USG Texture XII**, spray-applied sand finish for drywall.



SELECTOR GUIDE TO USG PAINT PRODUCTS

INTERIOR WALLS—GYPSUM BOARD				FINISH PRODUCT USED			
Type of Finish Desired	Special Surface New Work	Treatment Redecorating	Description	Thinners	Method Application	Hours Drying Time Touch Recoat	One Gal. Coverage (Sq. Ft.)
Velvet	SHEETROCK Sealer TEXOLITE Primer-Sealer	SHEETROCK Finish Coat GRAND PRIZE Paint	SHEETROCK Finish Coat GRAND PRIZE Paint	NR/w NR/w	B1, R1, S1 B1, R1, S1	1/2 1/2	450 450
Flat	SHEETROCK Sealer	Prime if needed	PRO-KYD Alkyd Flat	NR/ms	R1, S1, B1	3	400
Semi-Gloss	GRAND-PRIZE Latex Semi-Gloss Enamel	Self-priming	GRAND PRIZE Latex Semi-Gloss Enamel	NR/w	S1, B1, R1	1/2	450
Gloss	USG Alkyd Wall Primer-Sealer	USG Alkyd Enamel Undercoat	DIAMOND Lustre Enamel	NR/ms	S1, B1, R2	3	450
Epoxy Glaze	USG Epoxy Enamel or ACREPOX Finish None None	USG Epoxy Enamel or ACREPOX Finish None None	USG Epoxy Enamel or ACREPOX Finish USG Texture I USG Texture II	SS/USG NR/w NR/w	S1, B2, R2 B1, R1 B1, R1, S1	4 1/2 1	190-320 200 200
Sand Float Texture Orange-peel to Ripple Texture Heavy Stipple or Period Texture Medium Light to Medium Heavy Texture	As required Usually none	As required None	TEXTONE; then GRAND PRIZE Paint USG Texture Paint; then GRAND PRIZE Paint (also 2 finishes below)	W W	B, R, O B, R, O	1 1	9-36/lb. 27-54/lb.
Medium Light to Very Light Text. Sand Finish	Usually none None	None None	A-B TEX or USG Spray Texture USG Texture VII or XII (Drywall Surfer)	W W	B, R, S, O S	1 1	27-54/lb. 20-35/lb.
INTERIOR METAL (FERROUS) TRIM							
Flat (Water Thinned)	METAL COAT Iron Oxide Primer	None, if free of rust	GRAND PRIZE Latex Wall Paint	NR/w	B1, S1, R2	1/2	450
Gloss (Solvent Thinned)	METAL COAT Iron Oxide Primer	None, if free of rust	METAL COAT Enamel	NR/ms	B1, S1, R2	2	600

INTERIOR WOOD TRIM

Semi-Gloss	USG Alkyd Enamel Undercoat	USG Alkyd Enamel Undercoat	USG Satin-Lustre Enamel	NR/ms	S1, B1, R2	3	24	450-500
Gloss	USG Alkyd Enamel Undercoat	USG Alkyd Enamel Undercoat	DIAMOND Lustre Enamel	NR/ms	S1, B1, R1	3	24	450
Flat	USG Alkyd Primer-Sealer	None—dull gloss	PRO-KYD Alkyd Flat	NR/ms	R1, S1, B1	1	24	400
Gloss or Satin Finish Clear	USG Sanding Sealer	USG Sanding Sealer	USG Satin Finish Varnish or USG Polyurethane Clear Finish	NR	B only	2	12	500

INTERIOR CEILINGS—GYPSUM BOARD

Flat (Med. Scrub)	None, or TEXOLITE Primer-Sealer	None	USG Super Ceiling White	NR/w	B1, R1, S2	1/2	8	250
Flat (High Scrub)	TEXOLITE Primer-Sealer	GRAND PRIZE Latex Wall Paint	GRAND PRIZE Latex Ceiling White Paint	NR/w	B1, R1, S1	1/2	8	450
Textured	USG Texture I, II, VII, or XII	USG Texture I, II, VII, or XII	Any of above finishes for wallboard	see above	see above	see above	see above	see above

EXTERIOR CEILINGS—GYPSUM BOARD

Low Lustre			USG Low-Lustre House Paint	NR/ms	B only	2	24	450
Medium Lustre	Dry, clean, apply one coat Primer #894, 1 or 2 coats finish paint	IMPERIAL House paint	USG Latex House Paint	NR/w	B1, R1, S1	1/2	8	400
Gloss			IMPERIAL Gloss House Paint	NR/ms	B1, S1, R2	12	48	450

NOTES: "Drying Time" and "Coverage" estimates are based on average conditions. "Touch" = furniture can be returned to living areas. Abbreviations, Method of Application: B=brush, R=roller, S=spray, O=other: 1,2,3=order of preference. Thinners: NR/w=Not recommended, use water sparingly: NR/ms=Not recommended, use mineral spirits if needed: SS/USG=Special Solvent manufactured by U.S. Gypsum: W=water per directions.

chapter 3

methods of installation

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types of application

SHEETROCK Wallboard provides a variety of durable, fire-resistant easily decorated surfacing materials for interior walls, ceilings, and partitions. SHEETROCK may be applied in one or two layers directly to wood framing members, to metal studs or channels or to gypsum studs, ribs or backing boards.

Single Layer Application—This basic construction is used to surface interior walls and ceilings not exposed to extreme or continuous moisture, where economy, fast erection, and fire resistance are required. It is equally suitable for remodeling, altering and resurfacing cracked and defaced areas.

Double Layer Application—Consists of a face layer of SHEETROCK applied to a base layer of gypsum, wood fiber or mineral fiber board that is directly attached to framing members. This construction offers greater strength and higher resistance to fire and sound transmission. Walls and ceilings so constructed are highly resistant to cracking, easy to decorate. They minimize the possibility of fastener "pops" and discoloration over fastener heads.

Fastening Methods—Wallboard is applied by several alternate methods depending on the type of supports and materials used:

1. **Single Nailing**—conventional attachment for wood framing.
2. **Double Nailing**—for minimizing defects due to loosely nailed wallboard.
3. **Adhesive Nail-on**—continuous bead of DURABOND 200 or 300 Stud Adhesive applied to wood framing plus supplemental nailing; improves bond strength, greatly reduces face nailing needed.
4. **Screw Attachment**—USG Brand Screws are the best known insurance against fastener pops caused by loosely attached board. Recommended in wood frame application; required with drywall systems employing metal framing.
5. **Adhesive Attachment**—the latest advancement for producing the finest room interiors. Usually requires only supplemental fasteners to attach face layers to gypsum studs, ribs or backing boards. Reduced nail or screw fastening required saves spotting and sanding labor; minimizes nail pops and joint ridging.

planning the job

Advanced planning by the drywall applicator can mean savings in time and material cost and a better appearing job. Proper planning will result in the most effective use of material, the elimination of unnecessary joints, and the location of required joints at the least conspicuous places. Try to span the whole wall or ceiling from corner to corner with one sheet of wall-board. Use the longest practical lengths obtainable. This will keep butt joints to a minimum. End joints, when they occur, should be staggered.

In double layer construction, joints occurring in the face layer are offset at least 10" from parallel joints in the base layer. The layout of the base layer must be planned to account for this offset and still provide optimum joint finishing conditions and efficient use of materials in the face layer as mentioned above.

HORIZONTAL VS. VERTICAL APPLICATION



SHEETROCK Wallboard may be applied horizontally (long edges of the board at right angles to the framing) or vertically (long edges parallel to framing). Fire rated partitions generally require vertical application; see fire test for specific details.

Horizontal application is generally better because it offers the following advantages:

1. Reduces lineal footage of joint treatment up to 25%.
2. Strongest dimension of board runs across framing members.
3. Bridges irregularities in alignment and spacing of framing members.
4. Better bracing continuity—each panel ties more framing members together.
5. Joints on walls are at a convenient height for the finishing operation with a U.S.G. joint system.

For wall application, if ceiling height is 8'2" or less, horizontal layout of **SHEETROCK** panels will result in fewer joints, easier handling, and less cutting. If ceiling height is greater than 8'2" or wall is 4' wide or less, vertical application will be more

practical. For ceiling application, use whichever method will result in fewer joints.

In double layer construction on ceilings, apply base layer boards horizontally, at right angles to framing members; apply face layer either vertically or horizontally with joints offset. On walls apply base layer boards vertically with edges centered on framing members; apply face layer horizontally. **Exception:** When using predecorated TEXTONE Vinyl Panels or ULTRAWALL Panels for face layer on walls, apply base layer horizontally at right angles to studs.

FRAMING MEMBER SPACING

SHEETROCK may be applied directly over wood studs, joists and rafters, or assembled with metal and gypsum components into systems that provide excellent sound and fire resistant construction.

Maximum spacings for wood framing members to receive SHEETROCK wallboard are shown in the tables below. Spacings for systems components are shown in the descriptions of the various systems, Chapter 4.

Wallboard Thickness	Location	Application Method	Maximum Spacing Framing Members
Single Layer Application			
3/8"	Ceilings(4)	Horizontal	16" o.c.
3/8"	Sidewalls	Horizontal or Vertical	16" o.c.
1/2"	Ceilings(4)	Vertical	16" o.c.
		Horizontal	24" o.c.
1/2"	Sidewalls	Horizontal or Vertical	24" o.c.
5/8"	Ceilings(4)	Vertical	16" o.c.
		Horizontal	24" o.c.
5/8"	Sidewalls	Vertical or Horizontal	24" o.c.
Double Layer Application (1)			
3/8" (2)(3)	Ceilings(4)	Horizontal	16" o.c.
3/8" (2)(3)	Sidewalls	Horizontal or Vertical	24" o.c.
1/2" & 5/8"	Sidewalls	Horizontal	24" o.c.
1/2" & 5/8"	Ceilings(4)	Horizontal or Vertical	24" o.c.

NOTES: (1) Framing member spacing for single layer construction applies to both base and face layers when adhesive is not used. (2) Adhesive must be used for 3/8" wallboard double layer application. (3) Wallboard 3/8" thick is not recommended as base layer applied to metal framing. (4) Up to 6" of wool insulation may be applied resting on SHEETROCK Wallboard ceilings, provided the maximum framing member spacing is not exceeded and joints are finished.

WOOD FRAMING REQUIREMENTS

Wood framing meeting the following minimum requirements is necessary for proper performance of all gypsum wallboard fasteners:

1. Framework should meet the minimum requirements of FHA, ALSC and local building codes.
2. Framing members should be straight, true, of uniform dimen-

sion. Studs and joists must be in true alignment; bridging, fire stops, soil pipes, etc., must not protrude beyond framing.

3. All framing lumber should be of a good grade for the intended use, and 2"x4" nominal size or larger should bear the grade mark of a recognized inspection agency using grading rules for lumber recommended to American Lumber Standards Committee.

4. All framing lumber should have a moisture content not in excess of 15% at time of gypsum wallboard applications.

5. Do not attach gypsum wallboard to extremely soft framing members.

Failure to observe these minimum framing requirements, which are applicable to screw, nail and adhesive attachment, will materially increase the possibility of fastener failure due to warping or dimensional changes. This is particularly true if framing lumber has greater than normal tendencies to warp or shrink after erection.

Framing should approach as closely as possible the moisture content it will reach in service by allowing the building, after it is enclosed, to stand as long as possible prior to the application of the gypsum wallboard. Provide heat in winter or during damp conditions at a uniform temperature in the range of 55° to 70°F. Provide ventilation to remove excess moisture.

ESTIMATING MATERIALS

Wallboard—From practical experience professional estimators have developed many methods of determining footage required to complete various types of jobs. Basically, these methods stem from the simple principle of "scaling a plan," and determining the length and width and ceiling height of each room on the plan. Frequently, door and window openings are "figured solid" with no openings considered. Exceptions may be large picture windows and large door openings. From these dimensions the estimator determines the square footage of each room. The footage of each room is added to determine total footage required. From these figures, the lengths of gypsum wallboard needed may be determined.

Plan to use the longest practical length of SHEETROCK wallboard that will span the ceiling and wall area. This will reduce butt joints to a minimum or eliminate them entirely. When estimating walls adjacent to sloping ceilings, plan carefully so that there will be a minimum of waste. Refer to Chapter 2—Products—for available lengths of each type wallboard.

For the convenience of the drywall applicator, the Rapid Room Measure Table shown on the next page gives the total area in sq. ft. (4 walls and the ceiling) of rectangular rooms with 8' ceiling heights. For net footage deduct openings.

RAPID ROOM MEASURE TABLE*
COMPUTATIONS FOR 8' CEILING HEIGHTS. THIS TABLE FOR SQUARE FEET SOLID MEASURE
(For Net Footage Deduct Openings)

	2'	2' 6"	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'	22'	23'	24'	25'	26'	27'	28'	29'	30'	
2'	68	77	86	104	122	140	158	176	194	212	230	248	266	284	302	320	338	356	374	392	410	428	446	464	482	500	518	536	554	572	2'
2' 6"	77	86.3	95.5	114	132.5	151	169.5	188	206.5	225	243.5	262	280.5	299	317.5	336	354.5	373	391.5	410	428.5	447	465.5	484	502.5	521	539.5	558	576.5	595	2' 6"
3'	86	95.5	105	124	143	162	181	200	219	238	257	276	295	314	333	352	371	390	409	428	447	466	485	504	523	542	561	580	599	618	3'
4'	104	114	124	144	164	184	204	224	244	264	284	304	324	344	364	384	404	424	444	464	484	504	524	544	564	584	604	624	644	664	4'
5'	122	132.5	143	164	185	206	227	248	269	290	311	332	353	374	395	416	437	458	479	500	521	542	563	584	605	626	647	668	689	710	5'
6'	140	151	162	184	206	228	250	272	294	316	338	360	382	404	426	448	470	492	514	536	558	580	602	624	646	668	690	712	734	756	6'
7'	158	169.5	181	204	227	250	273	296	319	342	365	388	411	434	457	480	503	526	549	572	595	618	641	664	687	710	733	756	779	802	7'
8'	176	188	200	224	248	272	296	320	344	368	392	416	440	464	488	512	536	560	584	608	632	656	680	704	728	752	776	800	824	848	8'
9'	194	206.5	219	244	269	294	319	344	369	394	419	444	469	494	519	544	569	594	619	644	669	694	719	744	769	794	819	844	869	894	9'
10'	212	225	238	264	290	316	342	368	394	420	446	472	498	524	550	576	602	628	654	680	706	732	758	784	810	836	862	888	914	940	10'
11'	230	243.5	257	284	311	338	365	392	419	446	473	500	527	554	581	608	635	662	689	716	743	770	797	824	851	878	905	932	959	986	11'
12'	248	262	276	304	332	360	388	416	444	472	500	528	556	584	612	640	668	696	724	752	780	808	836	864	892	920	948	976	1004	1032	12'
13'	266	280.5	295	324	353	382	411	440	469	498	527	556	585	614	643	672	701	730	759	788	817	846	875	904	933	962	991	1020	1049	1078	13'
14'	284	299	314	344	374	404	434	464	494	524	554	584	614	644	674	704	734	764	794	824	854	884	914	944	974	1004	1034	1064	1094	1124	14'
15'	302	317.5	333	364	395	426	457	488	519	550	581	612	643	674	705	736	767	798	829	860	891	922	953	984	1015	1046	1077	1108	1139	1170	15'
16'	320	336	352	384	416	448	480	512	544	576	608	640	672	704	736	768	800	832	864	896	928	960	992	1024	1056	1088	1120	1152	1184	1216	16'
17'	340	354.5	371	404	437	470	503	536	569	602	635	668	701	734	767	800	833	866	899	932	965	998	1031	1064	1097	1130	1163	1196	1229	1262	17'
18'	356	373	390	424	458	492	526	560	594	628	662	696	730	764	798	832	866	900	934	968	1002	1036	1070	1104	1138	1172	1206	1240	1274	1308	18'
19'	374	391.5	409	444	479	514	549	584	619	654	689	724	759	794	829	864	899	934	969	1004	1039	1074	1109	1144	1179	1214	1249	1284	1319	1354	19'
20'	392	410	428	464	500	536	572	608	644	680	716	752	788	824	860	896	932	968	1004	1040	1076	1112	1148	1184	1220	1256	1292	1328	1364	1400	20'
21'	410	428.5	447	484	521	558	595	632	669	706	743	780	817	854	891	928	965	1002	1039	1076	1113	1150	1187	1224	1261	1298	1335	1372	1409	1446	21'
22'	428	447	466	504	542	580	618	656	694	732	770	808	846	884	922	960	998	1036	1074	1112	1150	1188	1226	1264	1302	1340	1378	1416	1454	1492	22'
23'	446	465.5	485	524	563	602	641	680	719	758	797	836	875	914	953	992	1031	1070	1109	1148	1187	1226	1265	1304	1343	1382	1421	1460	1499	1538	23'
24'	464	484	504	544	584	624	664	704	744	784	824	864	904	944	984	1024	1064	1104	1144	1184	1224	1264	1304	1344	1384	1424	1464	1504	1544	1584	24'

*For rectangular rooms with 8' ceiling height—no openings.

Joint Treatment—For pre-filling “V”-grooves formed by abutting, rounded edges of SHEETROCK SW Wallboard, about 3 lbs. of DURABOND 90 Joint Compound-Multi-Purpose are required per M sq. ft. of wallboard.

For applying all U.S.G. joint systems, approximately 50 lbs. of joint compound and 370 ft. of PERF-A-TAPE reinforcing are required to finish 1000 sq. ft. of SHEETROCK Gypsum Wallboard.

The following table may be used when determining the quantities of joint treatment products needed for each job:

**Estimator for Joint System Products
(Tape and Compound Separate)**

With This Amount of SHEETROCK Gypsum Wallboard	Use This Amount of Compound	Or—This Amount of Ready-Mixed Compound	And This Amount of Tape
100 sq. ft.	5 lbs.	1 Gal.	1—60' roll
200 sq. ft.	10 lbs.	1 Gal.	2—60' rolls
300 sq. ft.	15 lbs.	2 Gals.	2—60' rolls
400 sq. ft.	20 lbs.	2 Gals.	3—60' rolls
500 sq. ft.	25 lbs.	3 Gals.	3—60' rolls
600 sq. ft.	30 lbs.	3 Gals.	1—250' roll
700 sq. ft.	35 lbs.	4 Gals.	1—250' roll
800 sq. ft.	40 lbs.	4 Gals.	1—250' roll & 1—60' roll
900 sq. ft.	45 lbs.	1—5 Gal. Drum	1—250' roll & 1—60' roll
1000 sq. ft.	50 lbs.	1—5 Gal. Drum	1—250' roll & 2—60' rolls

Screws—For applying single layer SHEETROCK Wallboard to wood framing approximately 1100 ea. of 1¼" USG Brand Screws—Type W are required per M sq. ft. of wallboard.

Fastener usage for other assemblies varies with the construction and spacing and is shown in the system description, Chapter 4.

Nails—Usage for nails is shown in the Selector Guide for Wallboard Nails, Chapter 2.

Caulking—The approximate lineal footage of caulking bead per gallon of USG Acoustical Sealant is: 375 to 400 for ¼" bead, 180 for ⅜" bead, 100 for ½" bead.

Adhesive—The following table shows the amount of adhesive needed per 1,000 sq. ft. of laminated wallboard surface:

Product	Approx. Quantity per M Sq. Ft.
DURABOND 500	5 gals.
DURABOND 600	3.5 gals.
PERF-A-TAPE Joint Compound—Taping	55 to 60 lbs. (A)

(A) Quantity shown is for sheet lamination. Estimate one-half this amount for strip lamination.

application recommendations



SCREW APPLICATION

USG Brand Screws are applied with a positive-clutch electric power tool, commonly called an electric screwdriver, equipped with adjustable screw depth control head and a Phillips bit. The use of screws provides a positive mechanical attachment of wallboard to wood and metal framing with fewer fasteners and less spotting. Here is shown correct use of electric screwdriver:

Set Screwdriver—Set adjustment for proper screw depth on scrap wallboard and framing. Screw head must be driven slightly below face of board but not deep enough to break the paper. To adjust, grasp control head firmly with one hand and loosen control head lock bushing with the other. Rotate control head to provide proper screw depth. When proper adjustment has been made, positively secure control head to maintain adjustment.

Place Screw—Magnetic tip holds drywall screw for driving. Bit tip does not rotate until pressure is applied to wallboard during application.

Enter Screw Straight—Firm hand grip on electric screwdriver is important for straight line of entry. Screw must enter perpendicular to board face for proper performance. Drive screws at least $\frac{3}{8}$ " from ends or edges of wallboard to provide a uniform dimple not over $\frac{1}{32}$ " deep.

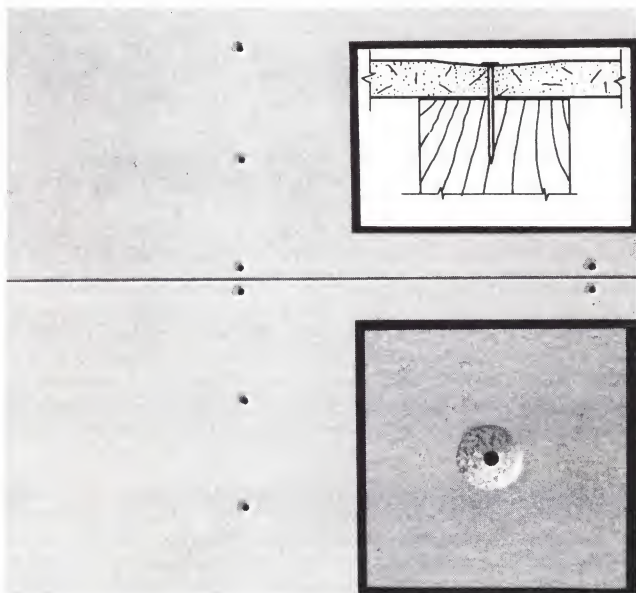
Operate electric screwdriver constantly during usage. When screw head is driven solidly against wallboard, screwdriver head will automatically stop turning and a positive clutch will disengage drive head. Remove screwdriver instantly or the motor will re-engage and chew up screw head or force it below surface of wallboard. When driving H-I-Lo screws, start with a vigorous thrust and continue with arm follow-through until the clutch cuts off. The electric screwdriver technique is relatively simple and a proficiency with the tool can be developed after a few hours' use. For description of USG Brand Screws, see Chapter 2; for screw spacing, see pertinent U.S.G. system, Chapter 4.

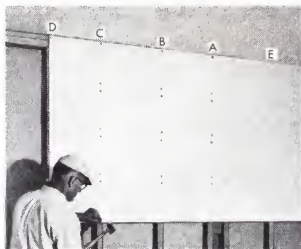
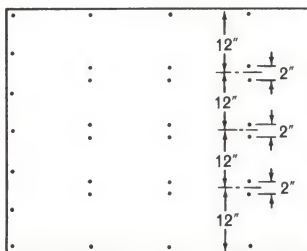
NAIL APPLICATION

1. Drive nails at least $\frac{3}{8}$ " from ends or edges of SHEETROCK wallboard.
2. Position nails on adjacent ends or edges opposite each other.
3. Begin nailing from *center* of wallboard and proceed toward outer ends or edges.
4. When nailing, apply pressure on wallboard adjacent to nail being driven to insure that wallboard is secured tightly on framing member.
5. Drive nails with shank perpendicular to face of board.
6. Use a WAL-BOARD hammer or crowned-head hammer.
7. With last blow of hammer, seat nail so head is in a slight uniform dimple formed by last blow of hammer.

Do not break paper at nail head or around circumference of dimple by over-driving. A nail set should not be used. Maximum depth of dimple should not exceed $\frac{1}{32}$ ".

For nail description, see Chapter 2; for spacing, see pertinent U.S.G. system, Chapter 4.





DOUBLE NAILING APPLICATION

In the double nailing method for attaching wallboard to wood framing, space the first nails 12" o.c. along the supports in the field of the board. Drive second nails about 2" from the first. Use single nails around the board perimeter (see drawing).

This application method helps prevent loose board and resultant nail pops that may occur when wallboard is not applied correctly and pushed tight against the framing. This method will not reduce the incidence or severity of nail pops due to wood shrinkage. (See Chapter 6 for data on lumber shrinkage.)

INSTALLATION

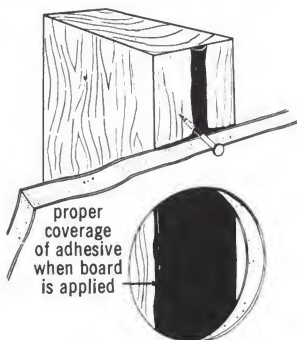
Ceilings: Starting in center of board and working toward edges and ends, hold the board tight against the ceiling joists and attach with nails spaced approximately 12" o.c. Drive secondary nails 2" to 2½" from first nails. Use single nails around the board perimeter. At ends space nails no more than 7" o.c.

Sidewalls: Illustration shows the correct double nailing procedure for sidewall application. Attach first board to top plate by driving single edge nails at points A, B, C, etc. Hold board tight against studs and apply nails in field of board in the number sequence indicated. Drive second nails within 2" to 2½" of the first. Use single nails around the board perimeter. Space end nails no more than 8" o.c.

Note: After second nails are applied, it may be necessary to restrike and drive home first nails which appear loose and do not hold wallboard tight. Check all nails for proper dimple.

ADHESIVE NAIL-ON APPLICATION

In the adhesive nail-on method a continuous bead of DURABOND 200 or 300 Stud Adhesive is applied to the face of wood framing with a cartridge gun. Gypsum wallboard is applied and attached



with only a minimum number of supplementary fasteners compared to conventional fastening methods (see next page for fastener spacing required). Spacing of framing members is the same as that used for conventional attachment.

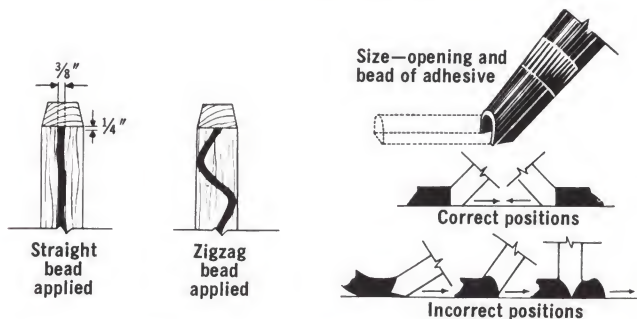
Advantages of the adhesive nail-on system using DURABOND 200 or DURABOND 300 are:

- Reduces up to 75% of the fasteners that cause most of the problems.
- Stronger than conventional nail application—
Up to 100% more tensile strength.
Up to 50% more shear strength.
- Unaffected by moisture, high or low temperature; vermin-resistant.
- Reduces loose board caused by improper fastening.
- Bridges minor framing irregularities.
- Will not stain or bleed through most finishes.

INSTALLATION

All surfaces to receive adhesive should be free of dirt, grease, oil or other foreign material. To facilitate flow, store adhesive at approximately 70°F. for 24 hours prior to use. The adhesive should be kept in the original unopened container prior to use, or enclosed to prevent evaporation of volatile materials. Unused portions of water-base adhesive remaining in can should be resealed or covered with a film of water to retard evaporation of thinners. Remove water before reusing.

Adequate ventilation should be provided during use to remove fumes emitted from the volatile agents in the solvent-base adhesive. Normal precautions (for a flammable material) should be employed regarding proximity to fire, sparks, or smoking before volatile materials are evaporated.



Adhesive is applied with a Drywall Adhesive Applicator—Model A-3 for bulk loading from 5 gal. cans, Model A-2M for $\frac{1}{4}$ gal. cartridges. For description of tools, see Chapter 7; for adhesives, Chapter 2.

Proper nozzle opening and gun position (see sketch) are required to obtain the right size and shape of bead for satisfactory results. Initial height of bead over framing should be $\frac{3}{8}$ " and of sufficient volume to provide $\frac{1}{16}$ " thickness of adhesive over the entire support.

Apply adhesive in a continuous $\frac{3}{8}$ " bead in the center of the attachment face and to within 6" of the ends of all framing members. Where two pieces of wallboard meet on a framing member, apply a serpentine or zigzag bead with an 8" repeat pattern permitting adhesive to contact both panels. Do not apply adhesive to members such as bridging, diagonal bracing, etc. into which no supplemental fasteners will be driven. Adhesive is not required at inside corners, top and bottom plates, bracing or fire stops and is not ordinarily used in closets.

Place wallboard shortly after adhesive bead is applied and fasten immediately, using proper screw or nail. After board has been applied, impact by hand along each stud or joist to insure good contact at all points.

Where fasteners at vertical joints are objectionable, panels may be prebowed and adhesively attached with fasteners at top and bottom only. Prebow board by stacking face up with ends resting on 2x4 boards or other blocks and center of panels resting on floor. Allow to remain overnight or until panels have a 2" permanent bow.



To insure a good bond, no more DURABOND 200 Stud Adhesive should be applied than can be covered in 15 minutes; no more DURABOND 300 Stud Adhesive than can be covered in 30 minutes. If adhesive is left exposed to the air for longer periods, the volatile materials will evaporate causing surface hardness that prevents a full bond.

Remove excess DURABOND 200 Adhesive from the surface of the wallboard (except predecorated boards), exposed finished surfaces and tools with naphtha, white gasoline or kerosene. Use water to remove excess DURABOND 300 Adhesive.

Allow adhesive to dry at least 24 hours before joint treatment.

Fastener Spacing— DURABOND 200 or 300 Stud Adhesive

Ceilings—Horizontal Application: Fasten at each framing intersection and 16" o.c. at each board end. One temporary field fastener per framing member required at mid-width of board. This fastener must be removed at the end of 24 hours.

Ceilings—Vertical Application: Space fasteners 16" o.c. along board edges and at each framing intersection on ends. Space temporary fasteners 24" o.c. on intermediate supports. These temporary fasteners must be removed at the end of 24 hours.

Walls—Horizontal Application: Same as Ceilings—Horizontal Application above, except that no field fasteners are required.

Walls—Vertical Application: Same as Ceilings—Vertical Application above, except that no fasteners are required on intermediate supports. Where fasteners at the vertical joints of the panel are objectionable, prebore the gypsum wallboard and apply fasteners 16" o.c. only at the top and bottom of the panel.



ADHESIVE APPLICATION—MULTI-LAYER

In adhesive application, SHEETROCK Wallboard or predecorated ULTRAWALL or TEXTONE Vinyl Panel face layers are job-laminated to a base layer of gypsum boards, gypsum studs or ribs or sound deadening boards.

Attachment of the face layer to the base layer with PERF-A-TAPE Joint Compound-Taping requires temporary support or supplemental fastening while drying; provides a tight bond, permits leveling and adjustment of boards after contact, and is used generally in fire and sound-rated construction. DURABOND 500 and 600 Contact Adhesives are ready-mixed—are used for specific applications.

When base layer is sound deadening board, the face layer of gypsum wallboard is attached using permanent face layer fasteners top and bottom of panel. Permanent face nailing in field of panel is required for a fire rating. For details on fire ratings, see Chapter 5; for construction data and applicable laminating procedure, see pertinent U.S.G. system, Chapter 4.

INSTALLATION—PERF-A-TAPE JOINT COMPOUND-TAPING (used as a laminating adhesive)

Directions for Mixing

- Mix PERF-A-TAPE Joint Compound-Taping in a clean metal container, using a sturdy mixing paddle (see Chapter 7—Tools).
- Use clean, drinkable water for mixing; follow quantities shown on bag.
- Pour all water into a container of suitable size, then sift powder into the water, stirring continuously.
- Mix for approximately 1½ minutes, to make sure all compound is uniformly damp and mixture is smooth.
- Allow mix to stand for a 30 minute soaking period and stir vigorously for approximately one minute to break down any lumps before use.
- The consistency of adhesive can be adjusted by adding small amounts of powder or water. Wet mix may be held for up to 24 hours by covering with a small amount of water.

Application—Face Layer—With PERF-A-TAPE Joint Compound-Taping and DURABOND 500 or 600 Adhesives, the face layers are attached by spreading the adhesive over the entire surface of the wallboard sheet, **sheet lamination**; or by applying PERF-A-TAPE or DURABOND 500 Adhesive in vertical strips, **strip lamination**.

Sheet Lamination is suitable for horizontal or vertical application of wallboard on walls and ceilings where the entire back surface of the face layer comes into contact with the base layer. Precut and prefit face panels as required and apply PERF-A-TAPE or DURABOND 500 Adhesive in beads $\frac{3}{8}$ " wide at base and $\frac{1}{2}$ " high and spaced $1\frac{1}{2}$ " to 2" o.c. with an Ames laminating spreader or a notched metal spreader blade. Spread adhesive uniformly over entire back surface of face panel to extreme edges. If using DURABOND 600, apply with spray or short-nap roller. Laminate face layer to base layer using moderate pressure and temporary nails, temporary supports, or USG Brand Screws Type G (see below for application details). Wipe off any adhesive forced out at edges. After laminating compound has thoroughly dried (usually 24 to 48 hours), remove temporary nails and shoring. Allow Type G screws to remain for later joint treatment.

In horizontal application, face layer end joints may occur on or between framing members. When end joints occur between framing members, follow back-blocking surface alignment procedure (see details this chapter), using wood supporting strips to assure alignment.

Three methods for providing face layer support are:

1. Temporary Nailing—Use nails that have at least $\frac{3}{4}$ " penetration into the framing to provide support for the face layer every 16" to 24". A double headed scaffold nail to which large fiber or wood washers are applied, stucco furring nails, or 6d cooler type nails backed up by gypsum board blocks (used as washers) may be used.

Where nails without gypsum blocks are used, place a thin wood block under claw hammer head when pulling nails to prevent damage to face layer. Properly dimple nail holes before applying joint treatment.

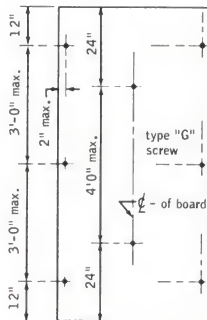
2. Temporary Supports—Provide temporary bracing or shoring that gives support to the face layer every 16" to 24".

3. USG Brand Screws—Permanently attach face boards with $1\frac{1}{2}$ " USG Brand Screws Type G. Using screws assures positive attachment while the adhesive dries and provides flush even face layer joints often not provided by temporary nailing. The $1\frac{1}{2}$ " Type G screw is not intended for use with $\frac{3}{8}$ " double wall or a combination $\frac{1}{2}$ " and $\frac{3}{8}$ " double wall construction or with sound deadening board base layers.

Apply adhesive just prior to face panel erection in order not to wet the base layer and reduce holding power of the screw. Press face layer firmly against base layer with one hand when driving screw. Adhesive should be thin enough to flow and level out as screw is driven.

82 installation methods/strip lamination

Place screws along vertical edges and in the field of the board as follows: (a) space screws along vertical edges within 2" of the joint, no further than 12" from either end and no more than 36" o.c.; (b) space screws in the field of the board along the centerline of panel, within 24" of either end and no more than 48" o.c. (see detail below).

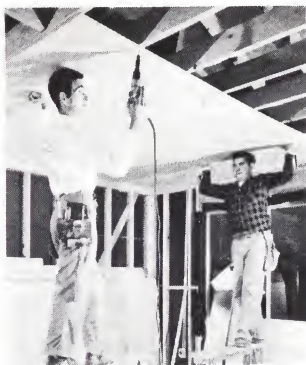


Strip Lamination is suitable for vertical application of face layer panels on walls, significantly reduces the amount of adhesive used, and simplifies attachment of the face layer. When used with supplemental Type G drywall screws, strip lamination provides flush even edge joints and positive attachment when the adhesive is drying that is superior to temporary nailing. This method is recommended when a high degree of sound control is required. It is not intended for use on ceilings or for horizontal application of face layers.

Precut and prefit face panels as required and apply adhesive in vertical strips, 24" o.c. to base layer or coreboard. Each strip should consist of four beads approximately $\frac{3}{8}$ " wide at the base and $\frac{1}{2}$ " high spaced $1\frac{1}{2}$ " to 2" o.c. The adhesive is applied most easily with a 7" or 10" Ames laminating head. Permanently attach face boards to base layer or core units with $1\frac{1}{2}$ " USG Brand Screws Type G located so they penetrate the adhesive strips (see description above for installation of Type G drywall screws).



application methods



SINGLE LAYER APPLICATION

The following procedures apply to the installation of single layer SHEETROCK Wallboard to conventional wood framing in residential construction. The fastening may be any one of several attachment methods (see page 74 for details); however, the USG Brand Screw Type W, designed specifically for this use, virtually eliminates loose attachment of gypsum boards. For recommended thickness of wallboard, method of application (horizontal or vertical) and spacing of framing, refer to Planning the Job, found earlier in this chapter. For complete information on fire and sound resistant assemblies, refer to Chapter 5.

Apply gypsum wallboard so the ends and edges occur over framing members, except when joints are at right angles to the framing members as in horizontal application or when the end joints are to be back-blocked (see page 86). To minimize end joints, use wallboard of maximum practical lengths. When end joints occur, they should be staggered. Joints on opposite sides of a partition should be so arranged as to occur on different studs.

SHEETROCK Wallboard should be applied first to the ceiling and then to the walls. If Insulating SHEETROCK Wallboard is used, apply with foil side against framing. Adjacent boards should be brought into contact but should not be forced into place. Abutting ends and edges and holes for pipes and electrical fixtures should be accurately cut and neatly fitted.

Usually two men are required to work on a ceiling. Fasten wallboard with screws or nails starting from the center of wallboard and working toward the ends and edges. While fasteners are being driven, the wallboard should be held in firm contact with the framing or joists. When single fasteners are used, attach wallboard to framing with screws spaced not to exceed 12" o.c. or with nails spaced not to exceed 7" o.c. Drive fasteners at least $\frac{3}{8}$ " from edges and ends of wallboard to provide a uniform dimple not over $\frac{1}{32}$ " deep.

Apply wallboard to the sidewalls after the ceilings are erected. Where horizontal construction is used on walls, top wall panel

is applied first and butted against ceiling. When vertical application is used, sidewall should be spanned from ceiling to floor by single length of SHEETROCK Wallboard.

Vertical application should be used where ceiling height is over 8'2" or where this method reduces waste and joint treatment.

On sidewalls, maximum fastener spacing for screws is 16" o.c. for framing spaced 16" o.c., 12" o.c. for framing spaced 24" o.c. For nails, maximum spacing is 8" o.c.

Where openings occur, use SHEETROCK Wallboard of sufficient length to span wall areas, covering the openings. If joints occur near an opening, however, the wallboard should be applied so vertical joints are centered, if possible, over door opening. No vertical joints, at any rate, should occur within 8" of external corners of windows, doors, or similar openings except at interior or exterior angles within the room and when control joints are used. Door and window openings usually can be cut out after SHEETROCK is applied.

After installation, pound on walls and ceilings to detect loose nails or screws, and push on board adjacent to fasteners to see if there is movement. If loose fasteners are detected, drive them tight. Whenever nails or screws have punctured paper, hold board tight against framing and install another fastener properly, approximately 1½" from screw or nailhead which punctured paper and remove the faulty fastener. When nailing wallboard to second side of a partition, check opposite side for fasteners loosened by pounding and drive them tight again.

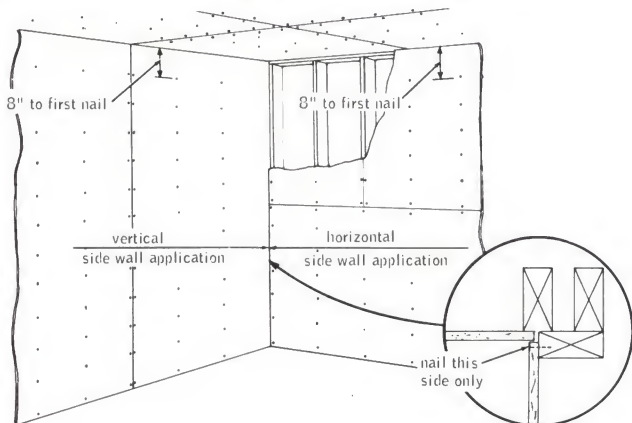
With platform framing and sidewall expanses exceeding one floor in height, float the wallboard over second floor joists using RC-1 SHEETROCK Resilient Channels (see Chapter 4 for application). As an alternate, install a horizontal control joint between wallboard panels at the junction of the bottom of top plates and the first floor studs (see Control Joint Installation described later in this chapter). Do not fasten wallboard to the wide face of joists or headers.

WOOD FURRING

Apply SHEETROCK Wallboard to wood furring strips as follows: Furring strips over wood framing must be 2"x2" (nominal) minimum size (may be nom. 1"x4" if wallboard is screw attached). Where SHEETROCK is applied parallel to furring strips securely attached to masonry walls, furring strips should be 2"x3" or 1"x3" (nominal) minimum size; where long edges of SHEETROCK Wallboard are applied across furring, strips should be 2"x2" or 1"x2" (nominal) minimum size. Spacing of furring strips should follow recommendations in table on Framing Member Spacing found earlier in this chapter. Fasteners for application of SHEETROCK over wood furring on masonry walls should not penetrate through furring strip into masonry.

Note: Application of SHEETROCK over 1"x1" (nominal) wood furring applied across framing members is not recommended since the relative flexibility of furring prevents proper fastening and tends to loosen nails or screws already driven.

FLOATING INTERIOR ANGLE APPLICATION



The floating interior angle method of applying gypsum wallboard effectively reduces angle cracking and nail pops resulting from stresses at intersections of walls and ceilings. Certain fasteners are eliminated at all interior angles, both where walls and ceilings meet and where sidewalls intersect.

Ceilings—Apply SHEETROCK Wallboard to ceilings first. Follow standard framing practices for corner fastening. Fit wallboard snugly at all angles.

Horizontal Application—Use conventional single nail or screw application where end of board abuts a wall intersection. Where long edges of board are parallel with the intersection, apply the first nail or screw nominally 7" from wall. Use conventional fastening in remainder of ceiling area.

Vertical Application—Use conventional single nail or screw application where long edges of board abut a wall intersection. Where ends of board are parallel to an intersection, apply the first nail or screw nominally 7" from the wall. Use conventional fastening in the remainder of the ceiling area.

Sidewalls—Apply all wallboard to maintain firm contact at the ceiling line and to provide support to ceiling boards previously installed. Along the horizontal angle, apply the first nail or screw nominally 8" from ceiling intersection. At all vertical angles, omit only the corner fastening of the board that is first applied and overlapped in the angle. Nail or screw the overlapping board in conventional manner. Use conventional fastening in remainder of sidewall area.

Double Nailing—When double nailing is used with a floating interior angle, follow above spacing on first nail from intersection and use double nailing in rest of area. Conventional framing and ordinary wood back-up or blocking at vertical internal angles must be provided.

BACK-BLOCKING APPLICATION

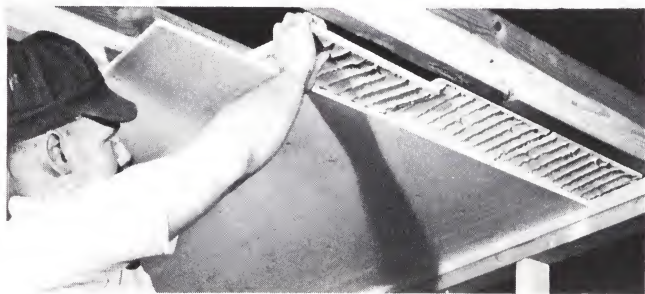
Back-Blocking is a system designed to minimize an inherent joint deformation ("ridging") in single layer gypsum wallboard construction, which sometimes occurs under a combination of adverse job and weather conditions. The Back-Blocking System, developed by United States Gypsum Company, has been widely used for years and produces outstanding results. This system is patented (Pat. No. 2,736,929) and may be used under a non-exclusive license agreement, readily available upon request.

Back-Blocking consists of laminating cut-to-size pieces of SHEETROCK Wallboard to the back surface of the wallboard directly behind the joints, providing reinforcement to resist stresses which cause ridging.

Back-Blocking long edge joints on SHEETROCK SW Wallboard is not required, but floating and Back-Blocking of all end joints, on both sidewalls and ceilings is recommended. End joints on both sidewalls and ceilings may be tapered by the Back-Blocking method at the discretion of the owner, architect or applicator.



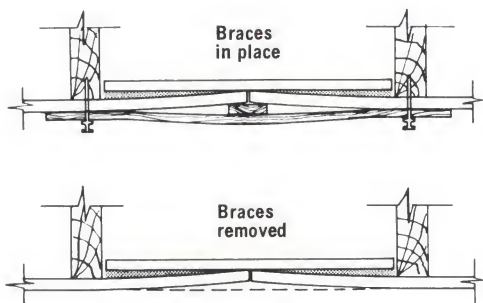
A. Backing blocks, 8" wide and long enough to fit loosely between joists, are spread with PERF-A-TAPE Joint Compound-Taping. Apply adhesive in beads $\frac{1}{2}$ " high, $\frac{3}{8}$ " wide at the base spaced $1\frac{1}{2}$ " o.c.



B. Apply wallboard horizontally with long edges at right angles to joists. Place backing blocks along full length of edge and ends of board. Floating of end joints makes it easier to form a good joint over a twisted stud or joist.



C. Immediately after all blocks are in place, erect the next board which has been previously cut. Butt ends loosely. One man can complete nailing the board while another cements and places the blocks.



D. Cross section shows how floated end joint is tapered and back-blocked. Brace is temporarily nailed over wood strip (top drawing) which depresses ends of boards. When strips are removed, tapered formation remains as shown in bottom drawing. (Sequence continued on next page.)



E. Position sidewall blocks between studs and hold flush with face by wallboard strips which have been recessed against sides of studs. Blocking must be flush or slightly behind nailing face of studs.



F. After wallboard panel is nailed in place, immediately butt adjacent panel over backing block. Stagger end joints between upper and lower courses of panels.



DOUBLE LAYER APPLICATION

The following procedure applies to the installation of a double layer of gypsum wallboard to conventional wood framed walls and ceilings in residential construction. SHEETROCK Gypsum Wallboard face layers are job-laminated to a base layer of BAXBORD Gypsum Backing Board that is attached to the framing. Because the construction minimizes the use of mechanical fasteners in the face layer, finer appearance is the result—together with greater strength and, with PERF-A-TAPE Joint Compound-Taping as the adhesive, higher fire and sound resistance (see Chapter 5 for details). Generally this construction consists of two layers of $\frac{3}{8}$ " gypsum wallboard but other thicknesses may be used to achieve additional values. For thickness of wallboard, applicable spacing of framing and methods of application see Planning the Job, found earlier in this chapter.

MATERIALS

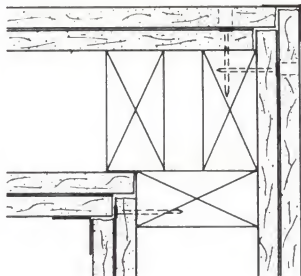
Base Layer— $\frac{3}{8}$ " BAXBORD Gypsum Backing Board in 4'x8' panels is especially designed for double layer system. BAXBORD is economical, easy to handle, and available plain or with aluminum foil on one surface to provide a vapor barrier and reflective insulation on exterior walls and top floor ceilings. (Regular $\frac{3}{8}$ " SHEETROCK Wallboard may be used as an alternate to BAXBORD for base layer.)

Face Layer— $\frac{3}{8}$ " Regular SHEETROCK or predecorated ULTRAWALL Panels in woodgrained finish. **Alternate:** $\frac{1}{2}$ " TEXTONE Vinyl Panels in a variety of patterns.

Fasteners—for $\frac{3}{8}$ " base layer— $1\frac{1}{4}$ " USG Brand Screws Type W, $1\frac{1}{4}$ " GWB-54 nails, 4d gypsum wallboard nails, or power driven staples. Staples should be 16 ga. flattened galvanized wire, $\frac{1}{2}$ " wide, 1" long, with divergent points. For temporary support of face layer, use nails of sufficient length to penetrate a minimum of $\frac{3}{4}$ " into nailing member, 6d cooler type nails, double-headed scaffold nails, stucco furring nails, or temporary bracing or shoring.

Adhesive—PERF-A-TAPE Joint Compound-Taping, or DURABOND 500 or 600 Contact Adhesive.

Joint Treatment—Select a U.S.G. joint system.



Corner detail

INSTALLATION

Base Layer Ceilings—Apply BAXBORD Backing Board horizontally on ceiling first with long edges perpendicular to framing members. End joints may occur on or between framing members and should be offset from face layer joints by at least 10".

Base Layer Walls—Apply BAXBORD with long edges parallel to and centered on framing members (vertically). **Exception:** for predecorated face layers, apply base layer horizontally.

Attachment—Fasten base layer wallboard with power-driven drywall screws, nails or power-driven staples spaced not to exceed the following:

a. **Drywall screws:** 16" o.c. on framing spaced 16" o.c., 12" o.c. on framing spaced 24" o.c.

b. **Single nails and staples:** 7" o.c. on ceilings, 8" o.c. on walls. If staples are used, drive staple with crown at right angles to long dimension of framing member except where paper bound edges fall on framing members; then drive staples parallel to edges. Drive staple so crown bears tightly against BAXBORD but does not cut paper.

c. **Double nails:** 12" o.c. Follow recommendations in Double Nailing Application found earlier in this chapter.

Face Layer Ceilings and Walls—Apply face layer first either vertically or horizontally depending on whichever results in the least waste and joints; offset joints at least 10". Apply wallboard to walls horizontally except with predecorated ULTRAWALL or TEXTONE Vinyl Panels.

Attachment—Adhesively apply face panels with PERF-A-TAPE Joint Compound-Taping or DURABOND 500 or 600 Adhesive (see Adhesive Application directions found earlier in this chapter).

DOUBLE LAYER CORNER DETAILS

On the inside corner, only the overlapping BAXBORD panel—not the face panel—is nailed to framing. A floating type corner results when joint is reinforced with a U.S.G. joint system.

On the outside corner, only the SHEETROCK Wallboard—not the BAXBORD—is nailed to the framing. At locations shown, use temporary nails or permanent nails penetrating framing approximately $\frac{3}{4}$ " and countersunk. Finish corner with metal corner bead and joint treatment.



predecorated wallboard application

The use of predecorated wallboard takes full advantage of the real economy of fire-resistant gypsum wallboard in providing highly serviceable, quickly installed, decorative walls. With TEXTONE Vinyl Panels, walls have long-lasting resistance to stains and scuffs, are readily washable and colorfast. These easily applied panels resist dimensional change caused by moisture, will not harmfully warp, crack or splinter. A variety of patterns in stipple, textured linen or woodgrained finishes are available for commercial or residential construction. With more economical ULTRAWALL Panels, decorative woodgrained finishes are easily provided in recreation rooms, kitchens and feature walls in living areas (see Chapter 2 for full product description).

Panels are usually applied vertically to the walls so ends occur at floor and ceiling lines. The beveled or square edges form an attractive joint not requiring joint treatment. Panels may be applied horizontally to wainscot height but are not practical as a ceiling finish as end joints are difficult to conceal. Adaptable for use with wood or metal studs in single or double layer application in new construction or over plaster or wallboard surfaces in remodeling. May also be applied to wood furring strips attached to masonry (see Wood Furring found earlier in this chapter).

INSTALLATION

Apply predecorated panels vertically. Position less than full width panels with the cut edge at the corner. Use USG Color Matched Nails wherever nails are exposed. Drive nails with a plastic-headed hammer, a rawhide mallet, or with a regular hammer having pliable leather placed over head. Space nails at least $\frac{3}{8}$ " from ends or edges.

Aluminum moldings in matching colors and woodgrains are available to provide the finishing touch to TEXTONE Vinyl and ULTRAWALL Panel installations. Refer to Chapter 2 for product description and color available.

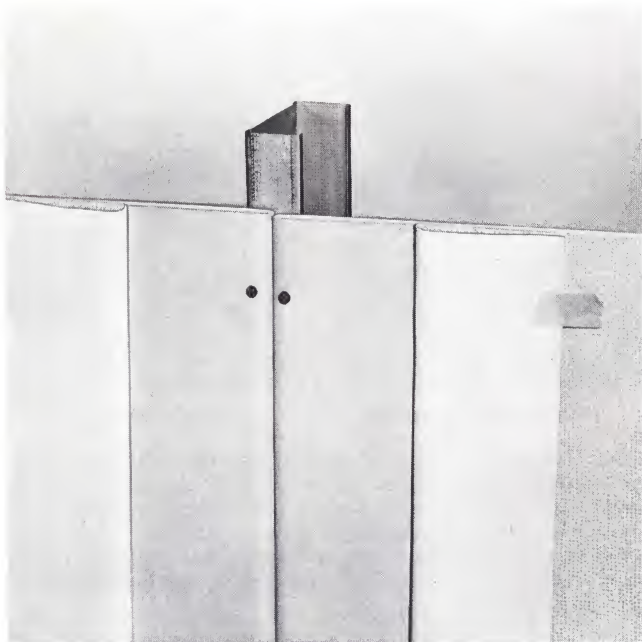
Prebowing—Where fasteners at the vertical joints are objectionable, panels may be prebowed, adhesively applied using a method shown below and fastened at top and bottom only. Pre-bow board by stacking panels face up with ends resting on 2x4 boards or gypsum board slutters and center of panel resting on floor. Allow board to remain overnight or until panels have at least a 2" permanent bow.

Single Layer Nail Application—Use USG Color Matched Nails $1\frac{1}{8}$ " long for ULTRAWALL and $1\frac{3}{8}$ " long for TEXTONE Vinyl Panels spaced not to exceed 8" o.c.

Adhesive Nail-On Application—Recommended with prebowing where nails at vertical joints are objectionable. Apply DURABOND 200 or 300 Stud Adhesive in $\frac{3}{8}$ "x $\frac{3}{8}$ " bead in the center of all stud faces and apply panels before 15 minutes with DURABOND 200, 30 minutes with DURABOND 300. Take care to keep adhesive from surface of panels. Impact along studs and drive $1\frac{1}{4}$ " (5d) nails spaced 16" o.c. at floor and ceiling line of panel. Refer to detailed description of Adhesive Nail-On application method found earlier in this chapter.

With DURABOND 400 Adhesive, apply adhesive as above, position panels and fasten at top. Bring panels in firm contact with adhesive, then draw back at bottom and block away from studs with 2x4. Keep panels in propped position for 30 to 60 minutes to allow adhesive to partially dry; then re-position against studs and fasten along bottom. Impact over framing members.

Adhesive Application—When predecorated panels are attached to coreboard or BAXBORD gypsum backing boards, panels are pre-bowed and applied using PERF-A-TAPE Joint Compound-Taping or DURABOND 500 Mastic Contact Adhesive as a laminating adhesive.



TEXTONE smoothwall panel application

TEXTONE Smoothwall Panels provide beautiful vinyl-surfaced walls without the usual panel joints. The panels combine the fire resistance of a gypsum board core with a rugged fabric-backed vinyl facing. Available in the same colors, patterns and sizes as TEXTONE Standard Panels. An extra vinyl flap at each long edge permits job-fabricating a flush joint with a nearly invisible butt seam in the vinyl surface. See Chapter 2 for full product description of TEXTONE Smoothwall Vinyl Panels.

INSTALLATION

Panel Erection—Cut panels to size and tape vinyl flaps back out of the way. Apply a $\frac{1}{4}$ " bead of DURABOND 200 or 300 Stud Adhesive to the face of studs that fall in the field of the panel. Keep adhesive about 6" away from ceiling and do not apply adhesive to studs at joints. Install panels vertically with edges centered on studs. Position panels so each joint has one short and one long vinyl flap. Fasten panel to studs at vertical joints and at corners with nails 8" o.c. or screws 12" o.c. and at each framing intersection on ends. Fasteners at panel ends are usually covered with base or trim.



Prefill screw-attached joint



Apply first coat

Joint Treatment—Apply fill coat of DURABOND 90 Joint Compound-Multi-Purpose to all vertical joints. Finish joints to a level and smooth surface with one or two coats of DURABOND 90 Joint Compound. Base coats of compound should be hardened but not necessarily dry before following coats are applied. Keep vinyl flaps free of compound and remove any compound that gets on the vinyl.

Finishing Vinyl Joints—A standard wheat paste or latex based adhesive such as Columbus Coated Fabrics Adhesive No. FC-100 should be used to finish vinyl joints. At vertical panel joints apply a generous amount of paste to short vinyl flap and press flap over joint. Use a broad knife to drive out air and excess paste. Apply paste to long flap and press in place overlapping short flap in same manner. Using a sharp knife and straight edge, cut both vinyl surfaces about 2" in from edge of long flap. Remove cut off vinyl from both flaps and relay vinyl to complete butt joint. Smooth with broad knife, sponge off excess paste with water and finish joint with a seam roller.



Level the joint



Apply paste



Smooth with broad knife



Trim edge strips



Remove trim strips

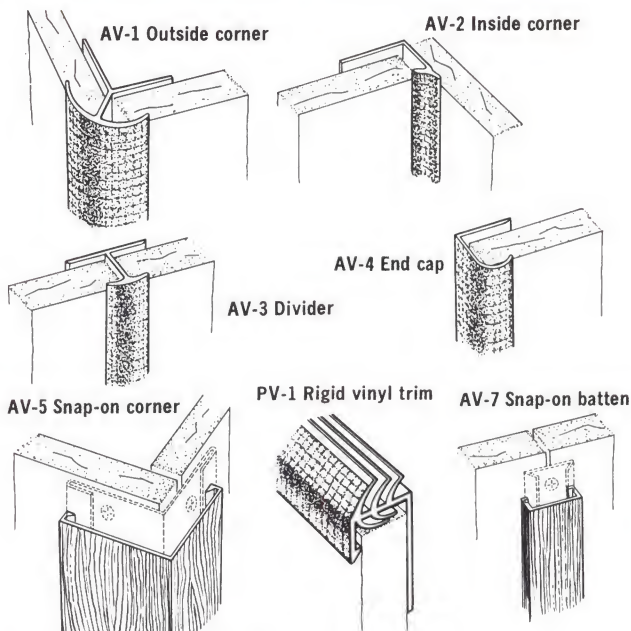


Roll edge flat

Exterior Corners—Apply AV-5 TEXTONE Molding vertically over all exterior corners. Place retainer strip over corner panels and fasten both sides with nails or screws driven through holes provided. Snap corner facing over retainer strip.

Interior Corners with Moldings—Place first panel in position and fasten to studs. Apply AV-2 TEXTONE Molding over first panel and fasten in place. Insert second panel in molding and fasten panel in place.

Interior Corners without Moldings—Erect first panel fitting it into the corner framing and fasten panel to studs. On the second panel, score back to width desired leaving at least 2" vinyl for flap. Snap board from back and carefully peel vinyl from scrap. Continue peeling vinyl flap about 2" in from panel edge. Erect panel, fasten to stud and spot fastener heads with DURABOND 90 Compound. Apply paste to the flap, press vinyl into corner with broad knife and cut vinyl exactly in corner. Sponge off excess paste and finish joint with seam roller.



TEXTONE moldings

Aluminum moldings and a rigid vinyl trim in matching colors and woodgrains are available to provide the finishing touch to TEXTONE Vinyl and ULTRAWALL Panel installations. Refer to Chapter 2 for product description and colors available.

INSTALLATION

1. Start installation from corner or door. Be sure that starting points are plumb or level.
2. Nail moldings with flat head wire nails 8" to 12" o.c. or fasten through holes provided in retainer.
3. Cut moldings to length with a fine-toothed hack saw. For mitering use same procedures as with wood molding.
4. **AV-1 Outside Corner**—Place molding over one panel at corner. Nail exposed side to stud. Insert next corner panel.
5. **AV-2 Inside Corner**—Place first panel into position. Apply molding over first panel. Insert second panel into place.
6. **AV-3 Divider**—Place divider on panel before putting into position. Nail exposed back flange to stud. Insert butting panel.
7. **AV-4 End Cap**—Apply panel to wall. Tap end cap molding into position.
8. **AV-5 Snap-on Corner**—Apply panels using adhesive or adhesive nail-on application. Place retainer strip over corner and fasten both sides with nails or screws driven through holes provided. Snap corner face over retainer strip.

9. AV-7 Snap-on Batten—Apply panels using adhesive or adhesive nail-on application. Place retainer strip over joint and fasten with nails or screws driven through holes provided. Snap batten face over retainer strip.

10. PV-1 Rigid Vinyl Trim—Place trim over edge of TEXTONE Panel. Then position board with trim pressed against abutting surface.

11. If moldings other than TEXTONE Moldings are used, they should be decorated prior to application over wallboards. Avoid application of masking tapes to moldings or predecorated panels when decorating.

SHEETROCK W/R application

SHEETROCK W/R and W/R FIRECODE "C" Wallboards are superior water-resistant bases for the adhesive application of ceramic, plastic and metal tile. Ideal for use in new construction in high-moisture areas such as bathrooms, powder rooms, kitchens and utility rooms. SHEETROCK W/R is also a cost-saver in modernization. New tile can be installed over existing surfaces without tearing out old walls. Installs quickly and easily to wood or metal framing or furring using standard attachment methods. Cut edges and nail heads should be coated with SHEETROCK W/R Sealant. Only joints that will *not* be covered with tile need be taped. Once these joints are finished, they are ready for a regular application of paint or wallpaper. See Chapter 4—Systems—for application of SHEETROCK W/R FIRECODE "C" Wallboard to meet fire ratings.



INSTALLATION

Framing—Check alignment of framing. If necessary, fur out studs around tub enclosure and shower stall so that the inside face of the lip of the fixture will be flush with the gypsum wallboard face (see details).

Install appropriate blocking, headers, or supports to support tub and other plumbing fixtures, and to receive soap dishes, grab bars, towel racks or similar items. SHEETROCK W/R is designed for framing 16" o.c. When framing is spaced more than 16" o.c., or when ceramic tile over $\frac{5}{16}$ " thick will be used, install suitable blocking between studs. Place blocking approximately 1" above top of tub or receptor and at mid-point between base and ceiling. Blocking is not required on studs spaced 16" o.c. or less. Vapor barriers should not be installed between SHEETROCK W/R Wallboard and framing.

Receptors—Install receptors before wallboard is erected. Shower pans, or receptors, should have an upstanding lip or flange at least 1" higher than the water dam or threshold at the entry to the shower.

Gypsum Wallboard—Apply SHEETROCK W/R Wallboard horizontally with the factory (paper bound) edge abutting the top edge of a temporary wood strip (or nail spacer) to allow at least $\frac{1}{4}$ " space between the lip of the receptor, tub or sub-pan and the wallboard.

Fasten with nails spaced 8" o.c. max. or drywall screws spaced 12" o.c. max. **Exception:** When ceramic tile over $\frac{5}{16}$ " thick will be used, space nails 4" o.c. max. or drywall screws 8" o.c. max.

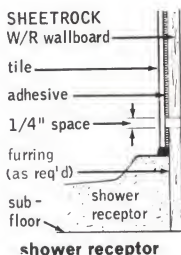
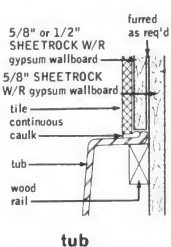
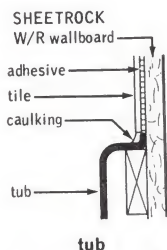
Alternate: When ceramic tiles less than $\frac{5}{16}$ " thick are used, DURABOND 200 or 300 Adhesive may be used instead of conventional nailing. Use fastener spacing applicable to ceilings.

Treat all cut edges, utility holes and joints, including those at angle intersections with SHEETROCK Brand W/R Spray Sealant prior to wallboard installation. Treat all fastener heads with sealant after installation.

In areas to be tiled, joints and angles should not be treated with conventional joint systems. Apply regular joint treatment only to joints and fastener heads not to be covered with tile.

In areas where sound transmission control is desired, the wall must be treated the same as for regular wallboard. However, resilient suspension of the board is not recommended where tile is to be applied.

NOTE:
5/8" SHEETROCK W/R FIRECODE
"C" gypsum wallboard base layer
required for 1-hour fire rating



Application of Tile—Use an adhesive approved by the manufacturer of the tile or surfacing material for use over gypsum wallboard. For ceramic tile, adhesive should meet CS 181-52. Water-thinned tile mastics, hydraulic cement thinset mortars and emulsion type tile mastics are not recommended.

Prior to tile erection, caulk flush all openings around pipes, fixtures, etc. with waterproof, non-hardening caulking compound. The tile installation should prevent water passage to backing material. Apply tile down to top edge of shower floor surfacing material, return, or tub lip. Tile should also overlap lip or return of tub or receptor (see details).

Apply tile to completely cover the following areas:

1. **Over tubs without shower heads**—6" above rim of tub.
2. **Over tubs with showers**—minimum of 5' above rim or 6" above height of shower head, whichever is higher.
3. **Shower stalls**—minimum of 6' above shower dam or 6" above shower head, whichever is higher.
4. All jambs in shower stall should be covered to a like height.
5. All areas beyond tub face should be covered a minimum of 4" from required height to finished bathroom floor (below tub rim). Areas beyond an exterior corner are excluded.

For all types of tile, take the following precautions:

1. Grout all tile joints to prevent water penetration.
2. Apply nonsetting caulking compound between wall surfacing materials and shower receptor flange or tub rim.
3. USG Acrylic Caulk at angle between tub edge and surfacing.

DECORATING RECOMMENDATIONS

Paint—Seal wallboard with solvent-thinned conventional wallboard primer-sealers such as USG Alkyd Enamel Undercoat. If fiber raising occurs, sand smooth and apply second coat. Generally, water-thinned primer-sealers are not recommended.

Use solvent-thinned enamels, semi-gloss or full gloss, such as USG Satin-Lustre or Diamond Lustre Enamel for finish coats.

Wallpaper—In moist areas where wallpaper is desired, seal wallboard with USG Alkyd Enamel Undercoat or SHEETROCK Sealer. Size primed surface for good adhesion of wallpaper.

metal trim application

PERF-A-BEAD, DUR-A-BEAD and ECONO metal corner reinforcement provide strong, durable protection to gypsum wallboard at outside corners. The exposed nose resists impact and forms an exact screed for finishing smooth corners. It should be used in one piece unless length of corner exceeds stock lengths.

USG Metal Trim serves to protect and finish wallboard around window and door openings and at intersections with other materials. It is recommended for use at the perimeter of partitions acting as sound barriers to form a recess for caulking.

These metal drywall accessories are easily installed by nailing or embedding and concealing flanges with joint compound. For product description, sizes and lengths available, see Chapter 2—Products.

GENERAL APPLICATION INSTRUCTIONS

USG Ready-Mixed Joint Compound-All Purpose, USG Joint Compound-Taping or All Purpose, or DURABOND Joint Compound-Taping or Multi-Purpose are recommended for embedding tape and for first coat application over metal flanges.

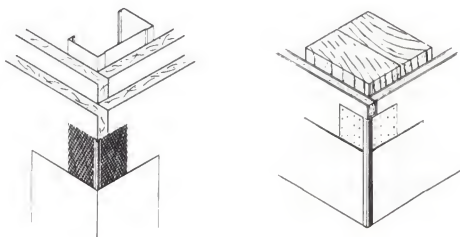
USG Ready-Mixed Joint Compound-All Purpose; USG Joint Compound-Taping, Topping or All Purpose, or DURABOND Joint Compound-Taping or Multi-Purpose are recommended for filling over paper flanges and for second coat application over metal flanges.

USG Ready-Mixed Joint Compound-All Purpose or USG Joint Compound-Taping or All Purpose are recommended for third coat and finishing application over paper and metal flanges.

1. Fasten accessory as outlined below and apply first coat of joint compound. Use nose of bead or trim as a screed for determining proper thickness of coat. Allow joint compound to dry 12 to 24 hours. (Under slow drying conditions, allow more time.) **Exception:** DURABOND Joint Compound-Taping need only have hardened prior to fill coat application.

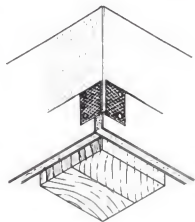
2. Apply second and third coats of joint compound feathering edges 2" to 3" beyond preceding coat. Allow each coat to dry thoroughly before applying another coat.

3. Sand lightly as required after each coat to remove jagged particles from metal angle and to smooth previous coat.



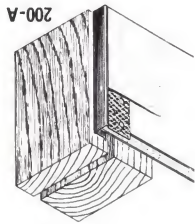
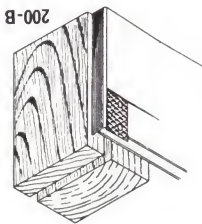
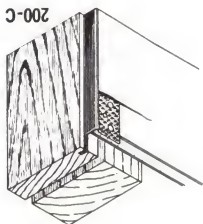
Finishing Outside Corners with PERF-A-BEAD Reinforcement

1. Apply joint compound on both sides of corner over entire area to be covered by PERF-A-BEAD.
2. Place PERF-A-BEAD tightly against corner and completely seat bead by running thumb and forefinger up and down outside nose of corner. Apply pressure with fingers to both paper flanges. Embed flanges by drawing knife down each side and removing excess compound under flanges.
3. Using metal corner angle as a screed, apply second and third coats of joint or topping compound as described above.



Finishing Outside Corners with DUR-A-BEAD and ECONO Reinforcement

1. Apply with wallboard nails or screws spaced 6" apart in both flanges; nails opposite. Nail to framing through gypsum wallboard.
2. Finish with three coats of joint compound as described above.



APPLYING METAL TRIM

No. 200-A USG Metal Trim ($\frac{1}{2}$ " and $\frac{5}{8}$ " size)—Apply SHEETROCK Wallboard, omitting fasteners at framing member where metal trim is to be installed. Leave a space $\frac{3}{8}$ " to $\frac{1}{2}$ " wide between edge of wallboard and face of jamb. This provides space for hardware or door bucks.

1. Slip metal trim over edge of wallboard, with wide knurled flange on room side of wallboard.

2. Nail through holes provided in knurled flange into wallboard and jamb, using fasteners recommended for thickness of wallboard and spaced not more than 9" o.c.

3. Finish with three coats of joint compound.

No. 200-B USG Metal Trim ($\frac{1}{2}$ " and $\frac{5}{8}$ " size)—Apply

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SHEETROCK Wallboard as described for No. 200-A trim, omitting nails and leaving $\frac{3}{8}$ " to $\frac{1}{2}$ " space at edge of jamb.

1. Place trim on edge of wallboard with knurled flange exposed, and nail to wallboard and framing with nails spaced no more than 9" o.c.

2. Finish with three coats of joint compound.

No. 200-C USG Metal Trim—This metal trim requires a slotted jamb for installation. Before installation, kerf door and window jambs $\frac{1}{8}$ " wide and $\frac{1}{2}$ " deep, kerf being $\frac{3}{8}$ " back from face of jamb. Apply SHEETROCK Wallboard as described for No. 200-A trim, with edge of wallboard bordering kerf.

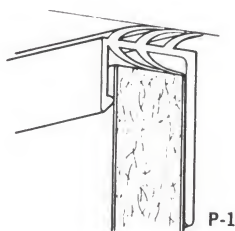
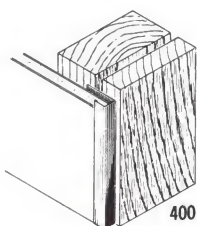
1. Insert plain metal flange in kerf, with knurled flange over face of wallboard.

2. Nail knurled flange to wallboard and framing, using recommended nails spaced not more than 9" o.c.

3. Finish with three coats of joint compound.

No. 400 USG Metal Trim ($\frac{1}{2}$ " size)—Apply trim to wall before SHEETROCK Wallboard goes up, by nailing into framing through long leg about 9" o.c. Slide SHEETROCK into channel; it is firmly held in place by short leg. No further edge nailing is necessary. Use same method for Nos. 401 ($\frac{1}{2}$ " size) and 402 ($\frac{5}{8}$ " size) Metal Trim.

USG P-1 Vinyl Trim (P-1A, $\frac{1}{2}$ " size, P-1B, $\frac{5}{8}$ " size)—Apply trim to edges of SHEETROCK SW Wallboard that will abut ceilings or walls. Slip trim over edges of wallboard for friction fit. Position wallboard, press trim edges against abutting surfaces for a snug contact and attach panels in usual manner. Use same procedure for both P-1A and P-1B Trim.





control joint application

USG Control Joints relieve stresses of expansion and contraction transverse to the joint in large wall and ceiling areas. Suitable for use in new construction or to prevent problems or in existing construction as a remedy. Made of corrosion-resistant zinc with a $\frac{1}{4}$ " wide slot and perforated flanges for stapling. A plastic tape, removed after joint finishing, protects the slot.

INSTALLATION

At control joint locations:

1. Leave a $\frac{1}{2}$ " continuous opening between panels for insertion of control joint.
2. Interrupt wood floor and ceiling plates with a $\frac{1}{2}$ " gap.
3. Do not attach metal studs to runners.
4. Provide separate supports for each control joint flange.
5. Install 9" wide No. 15 asphalt felt strips between gypsum sheathing and control joints in curtain wall construction using a stucco exterior.
6. Provide an adequate seal behind control joint where sound and/or fire ratings are prime considerations.

USG Control Joint No. 093—Apply over face of wallboard where specified. Cut to length with a fine-toothed hack saw (32 teeth per in.). Cut end joints square, butt together and align to provide neat fit. Attach control joint to wallboard with Bostitch $\frac{1}{2}$ " Type G staples spaced not over 6" o.c. in each flange. Finish with three coats of joint compound. Remove plastic tape after finishing.

USG Control Joint No. 100—Apply over face of gypsum sheathing and asphalt protection strip in exterior stucco curtain wall systems. Attach control joint with Bostitch $\frac{9}{16}$ " Type G staples spaced not over 6" o.c. in each flange. Splice end joints with two 3" pieces of 16-ga. galvanized wire inserted in the sections. At intersections the vertical joint should be continuous and the horizontal joint should abut it. Caulk splices, terminals and intersections with a silicone rubber caulking sealant. Remove plastic tape after finish plastering.

joint system application

Following are general recommendations for application of joint compounds listed in the order of preference—No. 1 in each case can be expected to provide the highest quality results:

First Coat: Embedding tape; first coat over beads; spotting fasteners	Second Coat: Filling over tape, beads and fasteners	Third Coat: Finishing over tape, beads and fasteners
1. DURABOND Compound- Taping	DURABOND Compound- Taping	USG Ready-Mixed Compound- All Purpose
2. USG Ready-Mixed Compound- All Purpose	USG Ready-Mixed Compound- All Purpose	USG Ready-Mixed Compound- All Purpose
3. USG Compound- Taping	USG Compound- Taping or Topping	USG Compound- Topping
4. USG Compound- All Purpose	USG Compound- All Purpose	USG Compound- All Purpose
5. DURABOND 90 Compound- Multi-Purpose	DURABOND 90 Compound- Multi-Purpose	USG Ready-Mixed Compound- All Purpose or USG Compound- Topping or All Purpose
6. PERF-A-TAPE Compound- Taping	PERF-A-TAPE Compound- Taping or PERF-A-TAPE Compound- Topping	PERF-A-TAPE Compound- Topping or All Purpose
7. PERF-A-TAPE Compound- All Purpose	PERF-A-TAPE Compound- All Purpose	PERF-A-TAPE Compound- All Purpose or Topping

A joint system serves to conceal and reinforce joints between SHEETROCK wallboard panels at flat butt joints, vertical corners and wall-ceiling intersections. Joint compound effectively conceals exterior corner reinforcements and exposed fasteners; repairs damaged wallboard to provide smooth continuous interior walls and ceilings ready for decoration. Joint treatment is not required with predecorated TEXTONE Vinyl or ULTRAWALL panels.

These outstanding qualities have been developed in U.S.G.

joint compounds: easy mixing, smooth working, ample wet mix life, good bond, minimum shrinkage, tight cohesion, minimum edge cracking, easy sanding, and no alkali burning of paint.

In reinforcing tape, U.S.G. has incorporated superior qualities of strength—as strong as the board itself—plus wafer-thinness for easy embedding, spark perforations to avoid air pockets and photographing, chamfered edges to resist cracking, pre-creasing for easier folding, and a natural bond with the compound.

To better solve the problems of the builder and drywall contractor, U.S.G. offers four groups of compounds for joint reinforcement of gypsum wallboards:

USG Brand Joint Compounds—a new group of non-casein type powder compounds that are ready for use as soon as mixed, are stable in wet mix consistency and have smoother application properties; **PERF-A-TAPE Joint Compounds**—still the standard of excellence among casein type powder products used for embedding tape and finishing; **DURABOND Joint Compounds**—polyindurate type powder compounds designed for quick hardening and one-day finishing, fast application, reduced shrinkage, earlier occupancy—ideal when drying conditions are slow; **USG Ready-Mixed Joint Compound—All Purpose**—ready for immediate embedding or finishing, saving time and waste on the job.

See Chapter 2 for detailed description of products, sizes and type available; Chapter 7 for application tools.

APPLICATION CONDITIONS

In cold weather (outdoor temperatures lower than 55°F.), thermostatically controlled heat must be provided to maintain 55°F. minimum temperature both day and night before, during and after entire joint treatment operation until house is occupied. Ventilation should be provided to eliminate excessive moisture. In glazed buildings, this may be accomplished by keeping windows open approximately two inches top and bottom (or side-pivoted windows approximately four inches) to provide air circulation. In enclosed areas lacking in natural ventilation, temporary circulators should be used. Under slow drying, allow additional time between coats of compound.

Applicators will recognize rapid drying conditions when the compound takes on a shorter working life especially on the feather edges and where one joint joins or crosses another. Rapid drying is usually due to low humidity and warm winds. During these periods make every effort to prolong the working and drying time of the compound. Stop drafts by closing doors and windows. Raise the humidity by liberally sprinkling sub-floors with water and placing open cans of water about the job. *Do not thin joint compound with additional water!*

CHECK WORKING SURFACES

Gypsum wallboard must be *firmly* fastened to framing members without cutting the surface paper or fracturing the core. Otherwise fastener "pops", ridges and cracking can be expected. Make certain board joints are aligned. When one board is higher than another it becomes difficult to leave sufficient compound under the tape covering the high board. Blisters, bond failure and cracks can easily develop in these areas. Check width and depth of the taper in the board. Too deep a taper often causes trouble. Green or wet framing lumber must be avoided at all costs, for warping and racking is almost sure to result which can cause not only fastener "pops", cracks and ridging but complete failure of the joint. Boards should be allowed to join normally, neither forced together or spaced apart. Open spaces between boards of $\frac{1}{4}$ " or more should be filled with compound at least 24 hours prior to embedding or first coat work. Good planning prior to hanging board will eliminate many unnecessary joints and avoid joints formed by more than two boards.

CARE OF EQUIPMENT

As with other crafts, applicators should keep tools and equipment clean and in good repair to secure maximum benefits. Mechanical taping and finishing equipment must be kept in perfect working order and all parts *must* be replaced as soon as they show the slightest signs of wear.

Mixing joint compounds in dirty buckets or failure to wipe down bucket as material is used causes lumps, scratches and usually creates hard working material.

DURABOND Joint Compounds are hardening type materials requiring that all tools, mixing containers, bread pans, etc., used for application be *thoroughly* cleaned before this hardening action occurs. Care of equipment is beyond our control and, therefore, United States Gypsum cannot assume any responsibility for any loss or damage to equipment.

Flush and clean DURABOND Joint Compounds from equipment with a conventional garden hose and brush before the hardening action takes place. *Immersion of equipment in water will not prevent hardening of the compound.*

Ames Tools:

Automatic Taper: Remove head plate and thoroughly clean (Bazooka) upper plunger area. Use narrow stiff bristle brush to clean head mechanism. Flush tube.

Hand Pump: Pump water through pump until clean. Remove bottom screen from pump and flush this area of the pump and the screen.

Finishing Boxes, Corner Roller, Release plunger plate to simplify cleaning box.

Corner Finisher: Flush with water until clean.

MIXING POWDER JOINT COMPOUNDS

1. Mix powder joint compounds in a clear 5-gal. container (preferably plastic for DURABOND Joint Compounds). The common

commercial potato masher makes a convenient mixing paddle. Power mixing saves considerable time, particularly where mixing in a central location is convenient. Power may be supplied by a ½" heavy duty electric drill operating at 400 RPM maximum (200 to 300 RPM even better). Drills operating at high speeds whip air into the compound. Mixing paddles may be of many variations (see Chapter 7—Tools). Keep mixing buckets and tools clean at all times. Containers having any residue of joint compounds in them may cause hardening, scratching and incompatibility problems.

2. Pour the proper amount of clean drinkable water into the container. Dirty water (such as that used to clean tools) will contaminate compound and cause erratic hardening of DURABOND compound. The amounts for type of application and powder are shown below and on the bag.

Table of Liquid Measures

	Ready-Mixed Pail	Standard 5-gal. Pail
Height—in.	13½	13
Diameter (Top)—in.	11¾	11¾
Diameter (Bottom)—in.	10¾	10¾
Pints	Depth—in.	Depth—in.
13	4¼	4¼
14	4½	4½
15	4¾	4¾
16	5	5
17	5½	5¼
18	5¾	5¾
19	6	6
20	6½	6¼
21	6¾	6½
22	7	6¾
23	7¼	7
24	7½	7½
25	8	7¾
26	8¼	8

Notes: All measurements to nearest ¼". Container dimensions are exterior. Depth measured in center of container.

**Recommended Water Quantity
(Pints per 25-lb. Bag)**

Type Compound	Hand Application	Mechanical Application		
		Taping	Fill	Finish
DURABOND Joint Compound				
Taping	13½	17½	15½	—
90-Multi-Purpose	13½	17½	15½	—
USG Joint Compound				
Taping	16	19	17	—
Topping	16½	—	16½	18
All Purpose	15	17	15	16
PERF-A-TAPE Joint Compound				
Taping	16½	19½	18	—
Topping	16	—	16	17½
All Purpose	16	18	16	17

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3. Sift the joint compound into the water, allowing complete wetting of the powder.

4. Stir to mix as shown below:

a. FOR DURABOND Joint Compound-Taping and Multi-Purpose stir vigorously for approximately 3 minutes making sure all compound is uniformly damp. If any batch lumps are present, allow the mix to soak for a minute or two. Re-mix the compound until smooth, and it is ready to use. *Note:* Keep the compound from being contaminated by any other materials such as other type joint compounds, dirty water or previously mixed DURABOND Joint Compound. Contamination will affect the hardening time and properties of the compound.

Mix only as much DURABOND Joint Compound as can be used within the time period shown on the bag (usually 2 hours for Taping and 1 hour for DURABOND 90-Multi-Purpose).

The compound will harden chemically after this time period even under water. Do not attempt to hold wet mix or immerse joint compound coated tools in water to hold back hardening. Re-tempering the compound is not recommended.

b. For USG Brand Joint Compounds, stir until the powder is uniformly damp, then after 3 to 5 minutes remix vigorously until smooth. *Note:* Do not add extra water. Use specified amounts of water as USG Joint Compounds will retain their original mixed consistency over extended periods. On occasions, some slight liquid separation or settlement of compound may take place in the bucket, but a brief remix will restore the compound to its original consistency.

c. For PERF-A-TAPE Joint Compounds, stir vigorously for about 1½ minutes—be sure all compound is uniformly damp. At this point, the mixture will appear somewhat dry and mealy. Do not add additional water. Excess water will not accelerate solution process although compound may appear to be workable.

Let mix soak for 30 minutes (longer at lower temperatures) to allow proper solution of the material. After soaking, stir 2 or 3 minutes until the mixture is a creamy, smooth consistency. Compound is now ready to use. *Note:* It is better to have a heavy consistency at the end of the soaking period, for then additional clean room-temperature water may be added, if necessary, to thin. To thicken mixture, add small amounts of compound, soak for 30 minutes and remix as described above.

MIXING PRECAUTIONS

1. Do not use more than the recommended amounts of water. Additional water will cause excessive or delayed shrinkage and loss of bond.
2. Do not allow compound to be contaminated by any other material such as other type joint compounds, water used to clean tools or residue from previously mixed batches remaining in containers. Contamination will adversely affect the working, bonding and hardening properties of the compounds.
3. Do not retemper DURABOND Joint Compounds.

HAND TOOL APPLICATION



Pre-fill Joints. Pre-fill the "V" groove between SHEETROCK SW Wallboard panels (diagram, above) with DURABOND 90 Joint Compound-Multi-Purpose. Apply compound directly over "V" groove with a flexible 5" or 6" joint finishing knife. Wipe off excess compound that is applied beyond the groove. Allow pre-fill compound to harden. When proceeding with PERF-A-TAPE Joint Compounds, this pre-fill compound must be dry.



Buttering Joints. Check all nails by drawing finishing knife across fasteners. Drive home protruding fasteners in board, leaving a dimple in surface paper of SHEETROCK Wallboard. Using a broad steel finishing knife, butter joint compound into channel formed by tapered edges of SHEETROCK, filling channel fully and evenly. Avoid heavy fills which increase the possibility of excessive shrinkage and check cracking.

Embedding Tape. Center PERF-A-TAPE reinforcement and press it down into fresh joint compound. Holding knife at an approximately 45° angle to board, draw knife along joint with sufficient pressure to remove excess compound. Leave sufficient compound under tape for proper bond but not over 1/32" under feathered edge. Do not use topping or finishing compound for embedding tape.



Covering Tape. When tape is embedded, apply a skim coat of joint compound immediately after embedding. This skim coat reduces the possibility of edge wrinkling or curling which may lead to edge cracking. Allow to dry completely. (See "Drying Time Guide," found later in this chapter.)



Spotting Fastener Heads. Apply first coat of compound over all fastener heads immediately prior to or after embedding tape. Use pressure on knife to finish compound level with wall surface. Spot fastener heads in a similar manner during second coat application of compound. During application of third coat over joints, sand fastener heads lightly and apply third finishing coat over fastener heads. DURITE SCREEN-BAK sanding cloth, 320 or 220 grit, is recommended for best results. Allow compound over fastener heads to completely dry. Light sanding may be necessary before decoration.

Second Coat Application. After embedding and covering coat is completely dry (under good drying conditions, 24 hours), apply second coat, feathered approximately two inches beyond edges of first coat. Spot fastener heads with a second coat application of compound. Allow to dry.



Third Coat Application. After second coat is dry, sand lightly. Apply a thin "finishing" coat to joints and fastener heads. Feather joint edges at least two inches beyond second coat. Sand lightly when dry.

End Joints. Butt or end joints are treated the same as tapered joints. When SHEETROCK Wallboard is applied, end joints should be loosely butted together. Fill joint with compound to a point slightly above surface of boards to allow for shrinkage in drying. Apply additional compound along each side of joint and embed tape as described for tapered joints. Apply covering, second, and third coats in same manner as for tapered joints. Finishing coats of joint compound must be feathered wider (approximately 18"), because there is no taper in which to embed tape.



Finishing Inside Corners. Fold tape along center crease. Butter both sides of corner with joint compound and apply tape. Apply second and third coats of compound (one side at a time) in the same manner that you would use to finish flat joints.

The PERF-A-TAPE corner tool with two blades specially angled to work the 90° inside corners of walls and ceilings may be used. Application procedure is the same, but tape and compound can be applied on both sides in one operation. Corner tool is angled slightly so about 1½" of blade tips contact the corner. After embedding tape, remove excess compound with tip of either blade. Final finishing is done with long continuous strokes.

MECHANICAL TOOL APPLICATION



1. Using DURABOND 90 Joint Compound-Multi-Purpose, prefill "V" groove between SHEETROCK SW Wallboard panels with special adapter for Ames tool. Allow to harden.



2. Using compound of suitable consistency, mechanically tape all joints. Touch up with broad knife. Allow to dry.



3. Mechanically tape interior angles. Finish both sides of angles with corner roller and corner finisher. Touch up with broad knife as necessary. Allow to dry.



4. Apply second coat of compound over tape on flat joints using hand finisher tool. Using compound of thicker consistency, spot fastener heads and apply first coat to metal trim. Allow to dry.
5. Apply third coat of compound to flat joints feathering edges about 2" beyond preceding coat. Apply finish coat to metal trim and fastener heads. Allow to dry and sand lightly as required before decoration.

USG READY-MIXED COMPOUND APPLICATION

1. USG Ready-Mixed Compound-All Purpose, suitable for embedding tape and fine finishing, is applied in same manner as other joint compounds. Use hand tool consistency for hand application, spotting fasteners and finishing metal trim. Use machine tool consistency for mechanical embedding and finishing.

2. Use the compound at package consistency to minimize shrinkage. If a thinner material is desired, Ready-Mixed can be quickly and easily thinned with water using a potato masher type mixing paddle. A drill type mixer is not recommended as this tends to whip air into the compound. Add the water gradually to speed the thinning process. When possible use cool to lukewarm (not hot) water. If applicator should inadvertently over-thin, simply add additional Ready-Mixed Compound to thicken and remix. To hold the wet mix in a metal container for prolonged periods, cover with a damp cloth or a thin layer of water. Pour off water, retemper for use.

3. Ready-Mixed Compound is sensitive to cold weather and must be protected from freezing. If material becomes frozen allow it to thaw at room temperature (do not force the thawing process). Retemper and usually it will again be usable, *unless* it has been subjected to several freeze-thaw cycles.

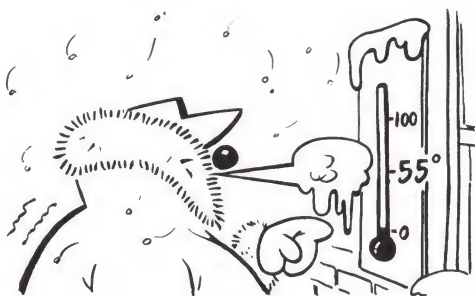
4. Ready-Mixed Compound can be used in tools and containers previously used for powder compound without a thorough "clean out."

APPLICATION SEQUENCE—DURABOND COMPOUNDS

1. Fill the "V" groove on SHEETROCK SW Wallboard joints with DURABOND 90 Compound.

2. Spot fastener heads throughout the entire job using DURABOND 90 Compound.
3. After the compound in the "V" groove has hardened, tape all joints and angles with DURABOND Compound-Taping.
4. Immediately apply second coat (fill) of DURABOND Compound-Taping over all joints and angles. This coat may be applied as soon as the taping coat has hardened (even though not dry).
5. Apply DURABOND Joint Compound-Taping over DUR-A-BEAD Metal Reinforcement. For best results use compound mixed 1-1½ hours previously. Apply second coat to all fasteners.
6. After the second coat (fill) application has hardened, apply the finishing coat of selected finishing compound completely covering all joints, angles, corner bead and fasteners.

Note: If the job is to be completed in one day, Steps 1 through 5 must be completed by the noon-hour break. This requires planning and scheduling according to the hardening times of DURABOND Joint Compounds.



COLD WEATHER TIPS ON TAPING AND FINISHING

All drywall joint compounds react to cold weather. Low temperatures slow the solution rate of the binder, and the mixing operation takes longer than on warmer days. After the initial mix, the compound should stand until a complete breakdown of the binder has taken place. This will require *at least 30 minutes and often much longer*, particularly if very cold mixing water has been used. If the temperature of the wet mix is estimated to be between 55° and 60°F., it should stand 30 to 45 minutes and up to 1½ hours if the temperature is between 40° and 45°F.

Failure to recognize and adhere to proper cold weather practices can lead to a number of serious and costly problems; bond failure, delayed shrinkage and paint discoloration, just to name a few of the more common types. In addition, any attempt to use material not completely in solution can increase application costs considerably. A heavy, dry working compound with a tendency to curl up behind the tools, especially on feathered edges during periods of low temperature, indicates that the

binder is not yet properly dissolved. Further evidence of compound not in solution is indicated by a "salt and pepper" appearance in the compound after being applied to the joint.

Good work can be secured during winter with very little extra effort or expense. Here are a few *tips* which will produce the desired results:

DON'T—add extra water just to speed up or ease the mixing operation. If the water temperature is very low, a small additional amount of water may be added (never more than an extra pint per a 5-gal. mix) to give more suitable working properties. Excessive water will cause excessive "sloughing off" or "watering down" as the mix stands in the pail. If applied to the surface, drying time is significantly slowed down, resulting in delayed shrinkage.

DON'T—use excessively cold or dirty mixing water, for it will make mixing difficult and delay the solution rate considerably. Here again bond failure and delayed shrinkage can easily occur. Many applicators bring warm (not hot) water from home. Others employ a blow torch to the side of the bucket for just the few minutes required to take the chill off the water prior to adding the compound. Still others mix the compound at home and bring to the job the following day. This practice insures peak performance from the compound during cold weather.

DON'T—allow compound to freeze in the bucket or on the wall. Once frozen, the material loses almost all its bond strength and must be replaced. If Ready-Mixed Compound freezes, move to room temperature to thaw. (*Do not* force thawing.) Re-mix and generally it will be usable.

DON'T—store tape and compound in areas subject to dampness. Tape is particularly sensitive to poor storage conditions, picking up moisture rapidly—one of the causes of center humping. Dampness seriously affects the working qualities of both tape and compound.

DO—provide proper heat and adequate air circulation. A minimum temperature of 55°F. should be maintained day and night all through the erection of the gypsum wallboard, taping, finishing, and until final decoration is thoroughly dry. The best practice by far is to use central heat. Temporary heat provided by salamanders, space heaters or unvented gas burners is usually unsatisfactory. Insufficient venting to carry off fumes from this type heating can cause staining of joint compound. Improper heat or inadequate air circulation causes uneven drying, leading to bond failure, delayed shrinkage and paint discoloration.

DO—provide proper ventilation to allow moisture to escape. Open windows slightly in various locations.

DO—allow sufficient drying time between coats and especially before any decorating is started. Cold, damp weather will cause slow drying of all types of joint and finishing compounds. Under adverse job conditions 48 hours drying time between coats is often insufficient. (See Drying Time Guide shown below.) Finishing over seemingly dry base coats, which are actually wet

underneath, is the principal cause of job failures and especially delayed shrinkage and joint discoloration. Joint compound which remains wet for a prolonged period tends to shrink excessively. Compounds requiring 48 to 72 hours to dry will always shrink more than if they had dried in 24 hours (except DURABOND Joint Compound-Taping and Multi-Purpose which reach maximum shrinkage within hardening time).

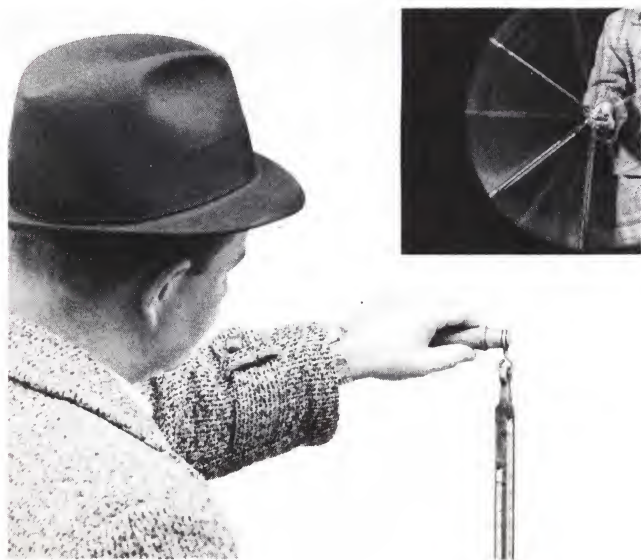
DO—plan work well ahead to operate under the most favorable circumstances. Mix compound well in advance—one of the major cold weather advantages of PERF-A-TAPE Compounds is that they can be held in a wet mix for 7 to 10 days without losing strength or fine application qualities. Insist on proper working conditions and resist all pressures to speed up applications until the preceding coat is thoroughly dry on every surface and angle.

DRYING TIME GUIDE

This guide provides a means for estimating drying requirements for drywall joint compound under various temperatures and humidity conditions. To figure drying time, determining the temperature and humidity with a sling psychrometer (see photo), then apply these figures to the chart on next page.

The drying times shown are for joint compound under tape, for evaporation of 10 lbs. water per 250' tape, corresponding to 1/16" to 5/64" wet compound thickness under the tape. The drying times for thicker (or thinner) coats of wet compound between the tape and board will be increased (or decreased) approximately in proportion to the wet compound thickness.

These drying times apply when the exposed surface of the tape is bare or nearly bare. A heavy compound coat over tape lengthens drying time.



Guide to Drying Time—Joint Treatment

Relative Humidity	Temperature					
	50°	60°	70°	80°	90°	100°
10%	21H	14H	10H	7H	5H	3½H
20%	23H	16H	11H	8H	5½H	4H
30%	26H	18H	12H	9H	6H	4½H
40%	29H	20H	14H	10H	7H	5H
50%	36H	24H	17H	12H	9H	6H
60%	42H	29H	20H	14H	10H	8H
70%	2¼D	38H	26H	19H	14H	10H
80%	3¼D	2¼D	38H	27H	19H	14H
85%	4D	3D	48H	34H	25H	18H
90%	6D	4¼D	3D	49H	36H	26H
91%	7D	4¾D	3¼D	2¼D	40H	29H
92%	8D	5D	3½D	2½D	44H	32H
93%	9D	6D	4D	2¾D	48H	36H
94%	10D	7D	5D	3¼D	2¼D	41H
95%	12D	8D	6D	4D	2¾D	48H
96%	14D	10D	7D	5D	3½D	2½D
97%	18D	12D	9D	6D	4½D	3¼D
98%	26D	18D	12D	9D	6D	4½D

D= Days (24 hrs.)

H= Hours

COVER COAT application

With ready-mixed COVER COAT Compound, drywall contractors are able to offer smooth or textured, white, ready-to-decorate surfaces on concrete ceilings and columns located above grade. Smooth application and excellent bonding strength make COVER COAT Compound ideal for filling small holes and crevices and for second and following covering applications with drywall methods and tools. COVER COAT Compound should not be applied over moist surfaces or surfaces likely to become moist (by condensation or otherwise), on ceiling areas below grade, on surfaces which project outside the building, or on other areas which might be subject to moisture, freezing, efflorescence, pitting or popping, movement, or other abnormal condition.

APPLICATION

1. For best results apply COVER COAT Compound before interior partitions are erected. Use the compound at package consistency to minimize shrinkage. If a thinner material is desired, the compound may be thinned by adding clean water (up to one pint per 5 gals. compound) and mixing to desired consistency using a potato masher or low-speed drill type mixer. If applicator should inadvertently overthin, simply add additional compound to thicken and remix.
2. Protect COVER COAT Compound from freezing. During entire application, temperature must be maintained at or above 55° F., and heat and ventilation must be provided when necessary.
3. All areas to be treated must be clean, dry and free from contaminants and all exposed metal protected with a rust preventative paint. Large projections should be chiseled off and brought flush with the concrete surface.
4. Apply COVER COAT Compound over the joints and ridges left

by the concrete forms with a "flat box" or knife. Fill in and/or level out small holes and lumps, ridges, lips, etc. with compound. Allow to dry.

5. Using two men, apply first coat of compound to entire surface area of ceiling, beam, or column with "flat box" or regular knife. Keep moving in one direction, making sure that each application overlaps the previous one. Follow "box" application with a pole drywall blade, 24" or wider, to smooth out "box" application, leaving a minimum of ridges and imperfections. Coordinate application of PERF-A-BEAD Reinforcement on angles and corners as required, embedding tape and covering both flanges with a smooth fill of COVER COAT Compound. Allow to dry (under good drying conditions, 24 hrs.)

6. **Second coat application**—sand and dust first coat. Apply second coat with "box" and pole drywall blade application described above or texture at this point if desired. Allow to dry. Sand to ultimate smoothness with fine sand paper, if necessary.

7. A very rough or uneven concrete surface may require three or more coats applied in the same manner.

8. COVER COAT Compound should be dry and dust-free if further decorating is desired. Seal with a good quality sealer (SHEETROCK Sealer or TEXOLITE Primer-Sealer is recommended) before finish decoration is applied.

9. More detailed written directions and special uses are available on request. Ask for Bulletin J-59.



texture finish application

Textured finishes for drywall surfaces are accepted for their decorative beauty and ability of obscure minor surface imperfections with economical spray application. U.S.G. offers a full line of products to create fine, medium or coarse textures, sand or simulated acoustical finishes or interesting patterned walls with stipple brush, stencils or other pattern devices. An idea booklet, describ-

ing possible special effects, "A Time for Texture", Form No. T-641, is available from your U.S.G. representative.

Application procedures vary with the individual texturing product and the particular texture desired. Specific directions shown on the product container should always be followed. For spray application data describing pressures and equipment specifications for particular products, refer to U.S.G. Paint Application Methods direction sheets available from your U.S.G. representative.

The information shown below reflects good application recommendations that are generally applicable to all texturing products.

See Chapter 2 for detailed description of texture products available; Chapter 7 for application tools.

Surface Preparation—All surfaces, including joint compounds and patching treatment, must be dry, clean and sound. Drywall joints and fastener heads must be properly treated. Smooth scratches and scuffs; dull glossy surfaces. Prime exposed metal with a rust-inhibiting primer. For best results, a good quality primer-sealer should be applied and allowed to dry prior to texturing. When using all purpose joint compounds for texturing, the primer-sealer should be oil-based.

Mixing—Follow specific instructions shown on the container. In general, use a clean mixing vessel and a mechanical mixer. Add the powder to the water and stir mix to a creamy, lump-free consistency. Let mixture soak for about 30 minutes to allow the various ingredients to go into solution. Stir the mix again and proceed with application. Adjust mix to proper spraying consistency for the texture desired with small additions of powder or water. Do not overthin as poor adhesion, lack of hide, lack of color and texture uniformity may result by adding excess water.

Application—Follow directions shown on the container for brush, roller or spray application and texture desired. Application below grade or in high humidity areas generally is not recommended. Provides 55°F. atmospheric and structural temperatures during and after application. Avoid use of unvented gas or oil heaters. Avoid drafts during application; then provide adequate circulating ventilation to aid drying. For comfort, use a respirator and protect eyes.

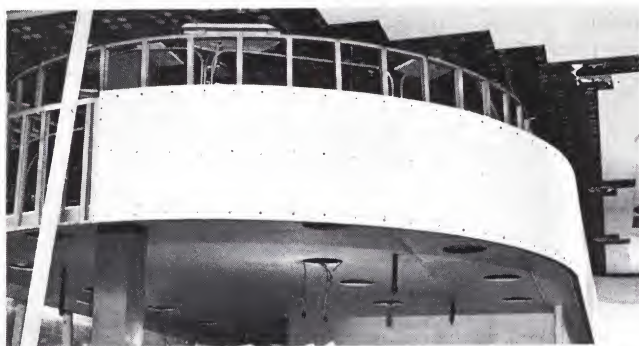
Storage—Store texturing products in a cool dry place. Close opened containers as air-tight as possible.

Care of Equipment—Thoroughly clean all equipment with water after each mix or at end of day as required by product directions.

Decorating—Some texture products may be tinted with suitable pigments or paints, but care should be taken when tinting since many pigments have a tendency to "float" to the surface unevenly and give an objectionable appearance. Check limitations shown on container. For best results texture finishes should be painted to add color and washability.

special applications

curved surfaces and arches



SHEETROCK Wallboard can be formed to almost any cylindrically curved surface. To apply board, place a stop at one end of the curve and gently and gradually push on other end of board, forcing center against framing until curve is complete.

By moistening the face and back paper thoroughly prior to application, and replacing in the stack for at least one hour the

board may be bent to still shorter radii. When the board dries thoroughly, it will regain its original hardness.

Minimum Bending Radii of Dry SHEETROCK Wallboard

Thickness	Length	Width
1/2"	20' **	
3/8"	7 1/2'	25'
1/4"	5'	15'

**Bending two 1/4" pieces successively permits radii shown for 1/4" SHEETROCK.



Arches of any radii are easily faced with SHEETROCK Wallboard and finished with a U.S.G. joint system. Score or cut through back paper of wallboard at 1" intervals to make board flexible. The board should previously have been cut to desired width and length of arch.

After board has been applied to arch with nails or screws, butter horizontal and vertical corner surfaces with compound. Crease PERF-A-TAPE in center. Make scissor cuts half-way through tape every 3/4" to make tape flexible. Apply tape half with cuts to wall surface, and fold over uncut half of tape onto underside of arch, as shown. Embed and apply second and third finishing coats of joint compound.

sliding doors

Sliding Door Frame — SHEETROCK is laminated to framing members with PERF-A-TAPE Joint Compound-Taping. This virtually prevents both fastener pops and the possibility of fasteners protruding through the usual 3/4" backing of frame. After installing sliding door frame, check to make sure there is sufficient backing where SHEETROCK panels join. Normally, this is about 4' up from subfloor.



Adhesive Application—Properly measure and cut SHEETROCK to fit over frame. Using a spreader blade, spread PERF-A-TAPE Joint Compound-Taping on section of sliding door frame to be covered first (normally the top section). This prevents pre-drying of adhesive. Joint compound should be mixed to adhesive consistency and applied in beads $\frac{1}{2}$ " high, $\frac{3}{8}$ " wide at the base and spaced $1\frac{1}{2}$ " o.c.



Application of SHEETROCK—Immediately following application of compound, apply prefitted SHEETROCK Wallboard to upper section of frame. Spread lower section of frame with compound and apply prefitted SHEETROCK Wallboard.



Shoring—Once wallboard is in place, pieces of wood or strips of SHEETROCK are temporarily nailed to frame with 6d double headed nails to hold SHEETROCK firmly while compound dries.

Finish—When PERF-A-TAPE Joint Compound has dried (usually overnight), remove temporary shoring, dimple remaining nail holes in the wallboard, and finish wallboard in normal manner.



resurfacing



Where ceilings or sidewalls are so badly disfigured that an entirely fresh surface is desirable, they may be resurfaced using a layer of $\frac{1}{4}$ " or $\frac{3}{8}$ " SHEETROCK Wallboard. Bright, new surfaces may also be obtained using predecorated TEXTONE Vinyl or ULTRAWALL Panels. For resurfacing masonry walls, see application of SHEETROCK to Wood Furring, described earlier in this chapter.

Preparation—Remove all trim (this is not always necessary when using $\frac{1}{4}$ " SHEETROCK). Remove all loose or poorly bonded material. Fill small holes with joint compound or patching plaster. Patch large holes to the surrounding level with single or multiple layers of SHEETROCK nailed to framing and shimmed out as required.

Electrical outlet boxes for switches, wall receptacles and fixtures should be extended outward to compensate for the added wallboard thickness.

Locate joists and studs by probing, and draw a chalk line to mark their full run. Where great irregularities of surface exist, apply furring strips not over 16" o.c., using wood shingles to shim out to a true, even plane.

Installation—Apply SHEETROCK horizontally or vertically, whichever method is most practical. Fasten with gypsum wallboard nails, cement coated, spaced 7" on ceilings, 8" on sidewalls. Nails must be long enough to penetrate into framing members at least $\frac{5}{8}$ ". Nail TEXTONE Vinyl or ULTRAWALL Panels over existing walls with matching color nails using a plastic headed hammer.

Wallboard may be adhesively applied over existing walls with PERF-A-TAPE Joint Compound-Taping, DURABOND 500 for regular or irregular surfaces or DURABOND 600 for flat, smooth surfaces only (see directions found earlier in this chapter).

Finish SHEETROCK Wallboard with metal corner reinforcement and joint treatment as necessary and replace all trim.

exterior ceilings and soffits



USG Exterior Gypsum Ceiling Board, $\frac{1}{2}$ " thick, is suitable for open porch and carport ceilings and soffits of eaves and rakes when the construction protects the board from direct contact with water. USG Exterior Gypsum Ceiling Board may be applied directly to wood framing or to cross furring of wood or USG Metal Furring Channels attached to main supports.

SPECIAL CONDITIONS

Wood furring should be 2x2 when main supports are 48" o.c. maximum. For screw application of board and when main supports are 24" o.c. maximum, 1x4 wood furring strips may be used.

Underlayment—In areas subject to freezing temperatures, shingled roofs should be provided with eaves flashing strips of not less than 55 lb. smooth rolled roofing or two layers of 15 lb. felt cemented together, extending inside face of exterior walls not less than: (a) 24" for pitches under 5 in 12; (b) 12" for pitches of 5 in 12 or over. If the pitch or overhang requires strip to be wider than can be covered by a single strip, all laps are to be cemented.

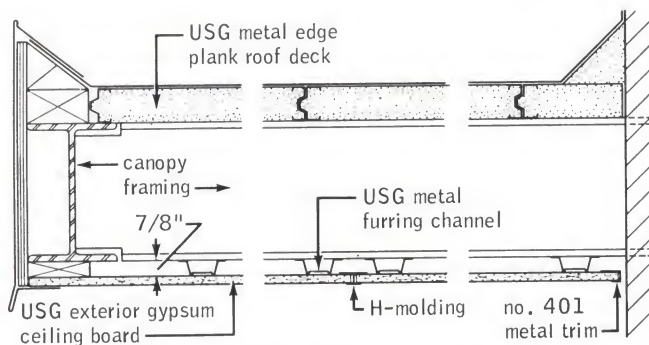
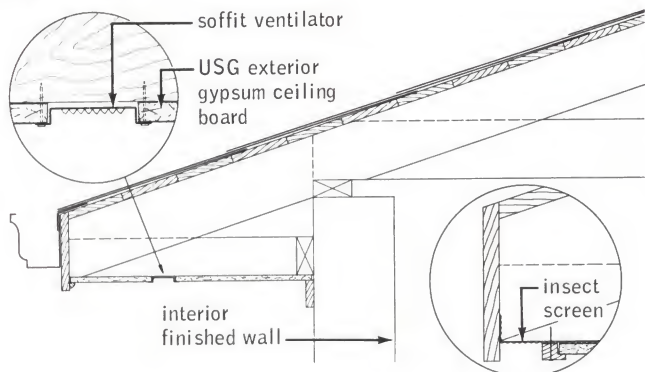
Metal Drip Edge extending a minimum of 3" under shingles must be provided at all roof edges.

Fascia Boards of sufficient width to provide a minimum of $\frac{1}{4}$ " drip below adjacent trim on underside of eaves, rake or ceiling must be provided.

Paint—All exposed surfaces should be painted with two coats of USG exterior paint (see Selector Guide, Chapter 2).

Ventilation—Each separate space between the roof and ceiling board installations should be provided with adequate cross ventilation. At least one sq. ft. of free ventilating area is required for each 150 sq. ft. of ceiling board. When ceiling board is applied

direct to rafters, vents should be provided at each end of each span. Rafters or joist spaces should have minimum 2" x full width between framing, screened vent at each end of each space. Vent opening should be framed and located within 6" of outer edge of eaves.



Walls, Beams and Columns—Allow at least $\frac{1}{4}$ " space between ceiling board and intersecting walls, beams and columns. Finish ceiling board edge with #401 Metal Trim and apply insect screen if desired or cover opening with wood trim.

Control Joints—USG Exterior Gypsum Ceiling Board, like other building materials, is subject to structural movement expansion and contraction due to change in temperature and humidity. Install control joints, consisting of two pieces #401 Metal Trim back-to-back in the ceiling board where expansion or control joints occur in the base exterior wall or ceiling. Where aluminum H-moldings are used, they will serve as control joints. Long narrow areas should have control joints spaced no more than 30' apart. Wings of "L", "U", and "T" shaped areas should be separated with control joints. Control joints may be placed to intersect light fixtures, vents, etc. which are usually considered weak spots.

Fixtures—Provide backing or blocking for electrical boxes, vents and heavy fixtures. Cut board neatly and accurately to fit within $\frac{1}{4}$ " of fixtures and vents. Cover openings with trim.

FASTENERS

Screws—1¼" USG Brand Screws Type W for wood framing, ⅞" USG Brand Hi-Lo Screws Type S for metal furring channels.

Nails—1½" galvanized box nail, 1½" galvanized roofing nail or 1½" aluminum nail for wood framing.

SUPPORT SPACING

Space framing or cross furring 16" o.c. for vertical board application or 24" o.c. for horizontal application.

APPLICATION

Apply exterior ceiling board horizontally or vertically with end joint occurring over supports. Allow ⅛" to 1/8" space between butted ends of board. Fasten board to supports with screws spaced 12" o.c. or nails spaced 8" o.c.

For wood framing, drive fasteners flush with surface of board and insert joints in H-moldings or cover joints with wood battens. If required, fasteners may be dimpled not more than 1/32" and treated with joint compound.

For metal framing, drive fasteners to provide uniform dimple not over 1/32" deep and treat fasteners and joints with a U.S.G. joint system.

**gypsum sheathing application**

FIRECODE Sheathing, with an asphalted gypsum core, provides a top-quality base for a wide range of exterior finishes—wood clapboard or aluminum siding, masonry veneer, wood and asbestos shingles, and stucco. It is widely used for garden apartments and light commercial construction as well as for single residences.

INSTALLATION

Apply 2'x8' FIRECODE Gypsum Sheathing horizontally to diagonally braced framing with fasteners spaced 4" o.c. When exterior finish will be fastened to studs, fasteners may be spaced 8" o.c. Apply 4'x8' and 4'x9' sizes vertically and fasten to framing (diag. bracing not necessary) 4" o.c. at perimeter and 8" o.c. at intermediate framing. Use 11-ga. roofing nails 1½" long or 16-ga. staples, ½" wide, 1½" long, with divergent points.

For sheathing application to USG 20-ga. Metal Studs, see Chapter 4—Metal Stud Curtain Wall System.

wood and metal runner attachment

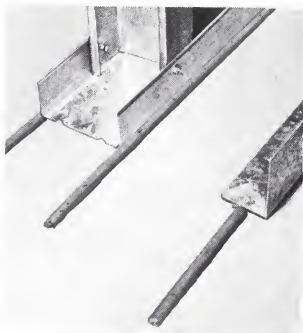


USG Drywall Partitions are secured to floors, ceilings and abutting walls with runners fastened to the supporting structure. The USG Metal Runner, a metal channel, is most commonly used, particularly with various systems employing a metal stud. The USG Solid, Double Solid and Triple Solid Gypsum Partitions are attached with a metal angle runner. A wood runner may be used when a nailer for wood base trim is needed but generally is not acceptable when a fire rating is required.

To improve the sound control characteristics of a partition, a non-hardening caulking material should be used under all wood and metal runners to seal the runner to the structure. Caulking of metal runners and face layer panel perimeters is required to obtain the sound ratings shown in Chapter 5.

INSTALLATION

Layout Partition—Properly position partition location according to the partition layout. Snap chalk lines at ceiling and floor. Be certain partition will be plumb.



Caulking—The surfaces to be caulked should be clean, dry and free of all foreign matter. Using an air pressure-activated or hand caulking gun, apply USG Acoustical Sealant in beads

about $\frac{3}{8}$ " diameter on either side of runners and studs at juncture with floor, ceiling and walls. Use single beads under angle runners. Then caulk perimeter of face layer panels after they are installed. Caulking material will keep its proper tacky consistency if stored on the job in an insulated box heated with a 100-watt light bulb.

Runner Installation—After caulking, securely attach runners:

1. **To concrete slabs**—using concrete stub nails, shielded screws, or power-driven fasteners.
2. **To gypsum or concrete block walls**—using square cut nails or power-driven fasteners.
3. **To suspended ceilings**—using expandable molly type fastener or toggle bolts.
4. **To wood framing**—using 12d nails or suitable screws.

Secure runners with fasteners placed at corners, at runner ends and spaced not to exceed 24" o.c. **Exception:** Fasteners securing floor runners in USG Studwall and USG Ribwall drywall partitions and all floor runners attached to wood framing should be spaced not to exceed 16" o.c.

At partition corners extend one runner to the end of the corner and butt the other runner to it allowing clearance for wallboard thickness as necessary. Runners should not be mitered.

sound deadening board and wool application

Many U.S.G. Drywall Partitions have been developed to meet the demand for increased privacy between units in residential and commercial construction. Designed for wood stud, metal stud or laminated gypsum board construction, these assemblies offer highly efficient sound control properties, yet are more economical than other partitions offering equal sound isolation.

These improved sound isolation properties and STC (Sound Transmission Class) ratings are obtained by using THERMAFIBER Insulating or Sound Attenuation Blankets or USG Sound Deadening Board. General application procedures for these products are shown below. See Chapter 4 for the specific components and construction details and Chapter 5 for sound ratings.

INSTALLATION—THERMAFIBER INSULATING, M-S AND SOUND ATTENUATION BLANKETS

Install blankets to completely fill the height of the stud cavity and with the vapor barrier to warm side of wall.

If necessary to tightly fill height, cut stock length blankets with a straight edge and knife or with a large pair of scissors for insertion in the void space. Tightly butt ends and sides of blankets within a cavity. Use 12" wide pieces of THERMAFIBER Sound Attenuation Blankets in narrow stud spaces next to door openings or at partition intersections, or install two 12" pieces with

tightly butted sides in 24" wide cavities. Fit blankets carefully behind electrical outlets, bracing, fixture attachments, medicine cabinets, etc.

M-S Blankets, flangeless and slightly wider than normal, are forced in place between studs. A snug friction fit eliminates need for fastening. Install a separate vapor barrier such as Insulating SHEETROCK Wallboard when using M-S Blankets.

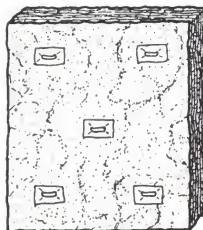
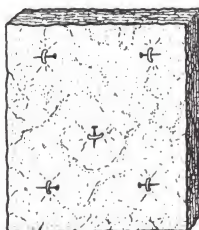
See Chapter 4 for specific application of plastic foam insulation.



ATTACHMENT—INSULATING BLANKETS

To Wood Studs—Using a power-driven or hand stapling gun, attach paper flanges to sides of studs and at top and bottom plate with staples having a 9/16" leg and spaced 6" to 8" o.c. Attaching blankets to face of stud generally causes wallboard to deform at the joint and makes joint treatment difficult.

To Gypsum Board—In metal stud and laminated gypsum board partitions, attach blanket to back side of gypsum board using staples applied with pistol type hand stapler. For 1½" and 2" thick blankets use staples with a 9/16" leg, for 3" thick blankets use staples with a 7/8" leg. Place staples at least 2" in from the edges, at each corner and along the vertical edges spaced not to exceed 24" o.c.



ATTACHMENT—SOUND ATTENUATION BLANKETS

To Gypsum Board—Using a pistol type hand stapler, attach blanket at each corner at least 2" in from edges and in center of blanket. Use staples with a 9/16" leg applied through a minimum 2" square heavy paper washer or staple over a 6d nail laid flat on the blanket. Either method prevents staple from pulling through the blanket.

INSTALLATION—USG SOUND DEADENING BOARD

Wood Fiber—Apply base layer sound deadening board vertically with joints staggered on opposite sides of the partition. Attach to each side of staggered 2"x3" wood studs with 6d cement coated gypsum wallboard nails. Space nails 12" o.c. along the vertical edges and 30" o.c. along the intermediate framing.

Apply the 5/8" SHEETROCK FIRECODE Gypsum Wallboard face layer horizontally. Fasten face layer with 7d cement coated nails spaced 7" o.c. and staggered from wood fiber sound deadening board nails. Finish joints with a U.S.G. joint system.

The above describes fastener spacing and application of wood fiber sound deadening board in 1-hr. fire-rated partition construction using staggered studs (UL Des 17-1 hr) having a 53 STC. Other drywall partition assemblies using wood fiber board and 2x4 wood studs are possible.

For partition construction used in IBI-20-FT rated at 50 STC, apply 1/2" base layer wood fiber board vertically to 2x4 wood studs with joints staggered on opposite sides. Fasten board around the perimeter and to intermediate framing with 5d cement coated gypsum wallboard nails spaced 12" o.c. Position 5/8" SHEETROCK FIRECODE Wallboard face layer vertically with joints offset 16" from the base layer and apply using adhesive strip lamination method. Caulk perimeter and finish joints.

For partition construction used in IBI-5-FT rated at 42 STC, apply 1/2" base layer wood fiber board horizontally to 2x4 wood studs and fasten to all supports with 5d cement coated gypsum wallboard nails spaced 12" o.c. Apply 1/2" SHEETROCK Wallboard face layers vertically with joints staggered using strip lamination method and temporary nailing 24" o.c. until adhesive is dry. Caulk perimeter and finish joints.

Mineral Fiber—Apply base layer of mineral fiber sound deadening board vertically with joints staggered on opposite sides of the partition. Attach board to each side of metal studs with 7/8" USG Brand Hi-Lo Screws Type S spaced not to exceed 27" o.c. along vertical joints and at quarter and mid-points of panel height along intermediate stud. Place two screws at each end of board through runner 1" from each vertical edge.







Apply 1/2" SHEETROCK FIRECODE "C" Wallboard face layer vertically with joints staggered from base layer joints. Apply face layer adhesively using PERF-A-TAPE Joint Compound-Taping and sheet lamination method. Fasten board around the perimeter with 1 5/16" USG Brand Hi-Lo Screws Type S spaced 12" o.c. Finish joints.

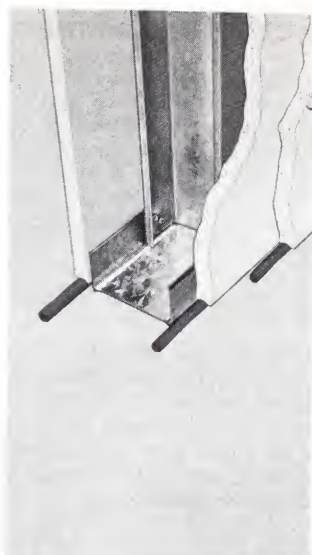
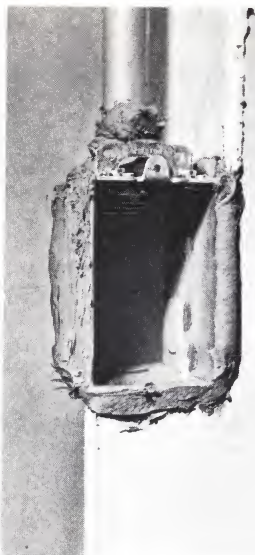
The above described fastener spacing and application of mineral fiber sound deadening board in 1-hr. fire-rated partition construction (UL Des 23-1hr) rated at 48 STC. A similar construction with 5/8" SHEETROCK FIRECODE face layers, screw spacing 16" o.c., and 3 5/8" USG Metal Studs has a 52 STC and an estimated 2-hr fire rating.

sealant application (caulking)

Where a drywall partition is used as a sound barrier, USG Acoustical Sealant should be used to seal all cut-outs and all intersections with the adjoining structure. The sound that will leak through a one-inch opening will offset the entire sound transmission loss value of a partition. Caulking at the runners and around the perimeter of the face layer wallboard is required to achieve sound transmission loss values on the job that approximate those determined by test. Caulking has proven to be the least expensive way to effectively seal the wall to prevent sound leaks. All references herein to "caulk" or "caulking" indicate use of USG Acoustical Sealant.

Laboratory sound tests, conducted at Riverbank Laboratories, confirm and compare the effectiveness of caulking. The assemblies tested consisted of No. 358 USG Metal Studs 24" o.c., double layer 1/2" SHEETROCK Wallboard screw-attached each side and erected with space around the perimeter; 1" THERMAFIBER Sound Attenuation Blankets between studs. Results of six caulking conditions are shown below:

Caulking Condition	Tested STC	Comments
 <p>Uncaulked</p>	19	Leakage dropped STC from 54 to 19.
 <p>Single bead of sealant under runner</p>	30	Sealant closed void but did not seal leakage between wallboard and runner
 <p>Beads of sealant under base layer each side</p>	48	Beads of sealant closed void and sealed runner—a tremendous improvement.
 <p>Two beads of sealant each side</p>	51	Double beads seal runner and wallboard; 3 STC improvement is worthwhile.
 <p>Two beads of sealant each side and one under runner</p>	52	Runner and wallboard sealed but 1 STC improvement does not justify expense.
 <p>Six rows of sealant, two each side and under runner</p>	54	Void is closed and six beads assure no possible leakage. Improvement does not justify expense.



INSTALLATION

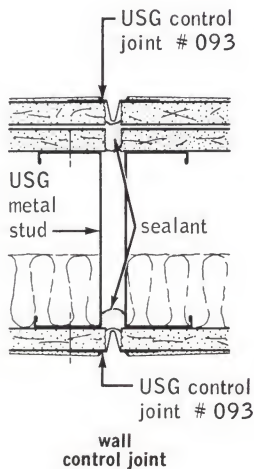
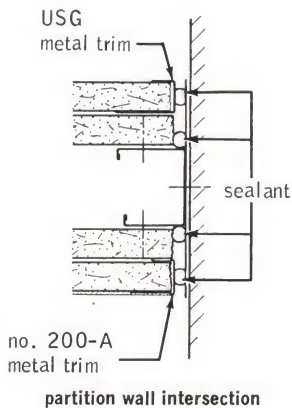
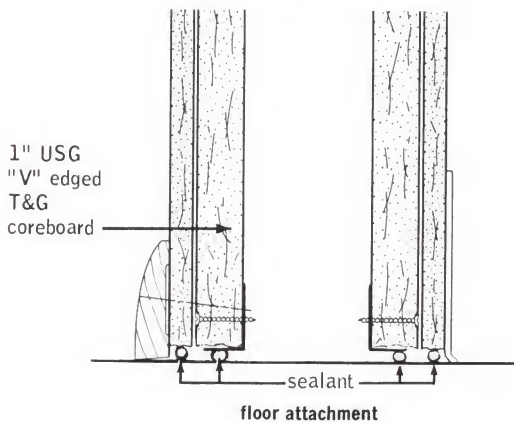
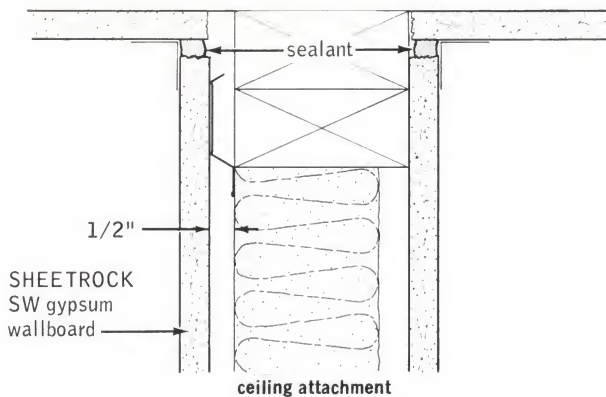
Runners—Caulk all runners at the floor and ceiling and runners, used at partition intersections with dissimilar wall construction. For details, see Wood and Metal Runner attachment described earlier in this chapter.

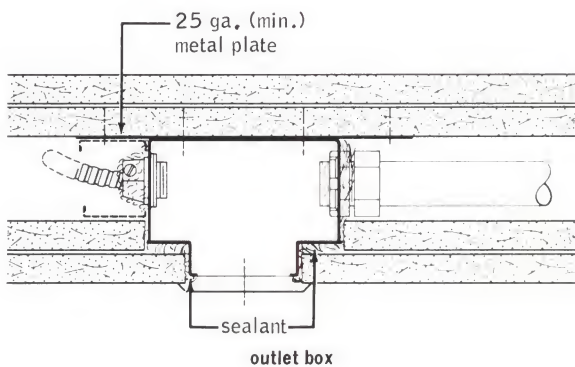
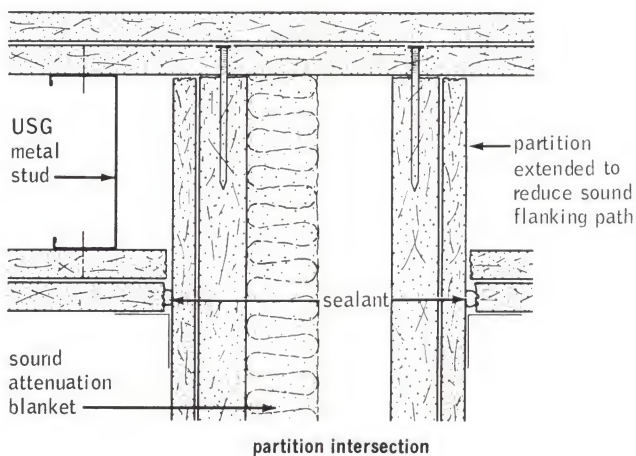
Partition Perimeter—Apply appropriate metal edge trim to the wallboard face layer around the entire partition perimeter. Leave a groove of approximately $\frac{1}{4}$ " wide at the floor, ceiling and intersections with dissimilar walls. Fill groove with caulking. Finish over groove with base or trim as desired. Where metal edge trim is not desired, caulked intersections of SHEETROCK Wallboard may have joint treatment applied in the normal manner over caulking. Caulked intersections without metal trim are likely to crack under structural movement or when dissimilar materials are abutted. Cracking may be minimized by slitting in the angle or flat taping.

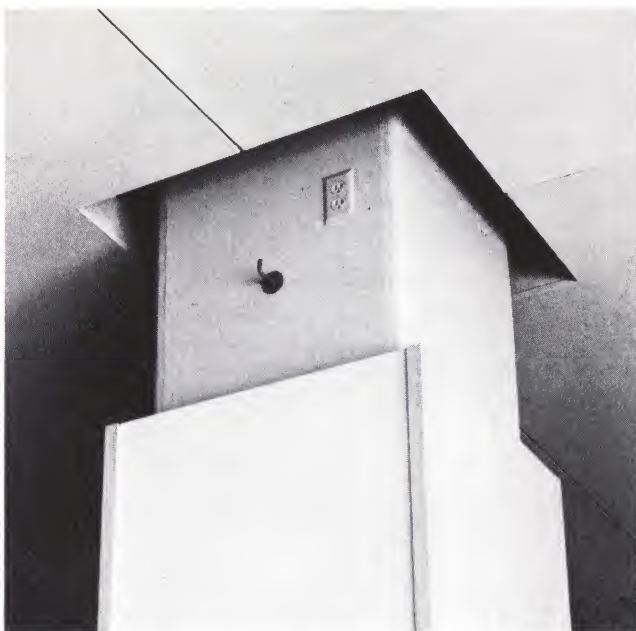
Control Joints—Caulk beneath control joint application to reduce flanking path for sound through control joint.

Partition Intersections—Caulk face layer of partitions intersecting sound isolating partitions that are extended to reduce sound flanking paths.

Openings—Apply a $\frac{1}{4}$ " minimum round bead of caulking around all cut-outs such as at electrical boxes, medicine cabinets, heating ducts and cold air returns to seal the opening. Caulk sides and backs of electrical boxes to seal them.



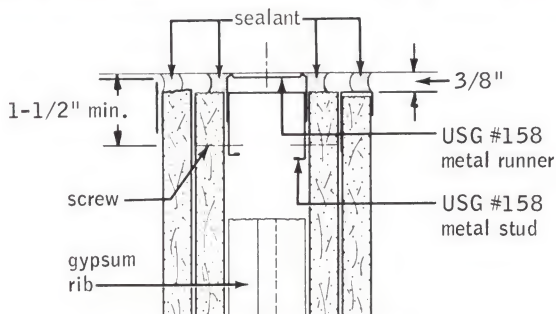




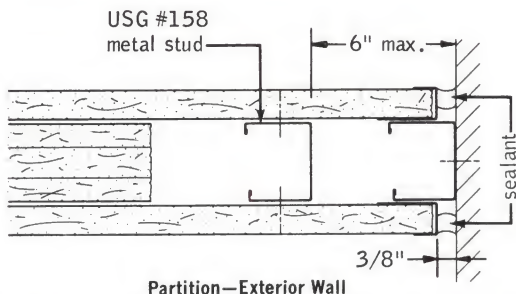
perimeter isolation

The perimeters of non-load bearing drywall surfaces should be isolated from all structural members, except the floor. Isolation is important to reduce possibilities for cracking in partitions, ceilings, wall furring and column and beam fireproofing. Generally, methods for isolating surfaces are detailed and specified according to the job. The typical intersection applications described below may be adapted as required.

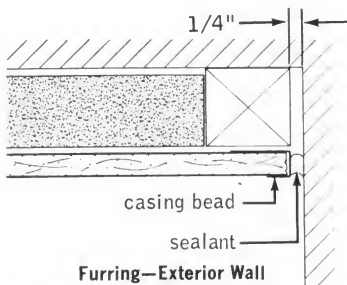
Partition—Structural Ceiling—Attach metal runner to structural ceiling to position partition. Attach wallboard only to horizontal metal stud inserted in runner to form slip joint. Allow $\frac{3}{8}$ " min. clearance atop partition; caulk as required for sound control.



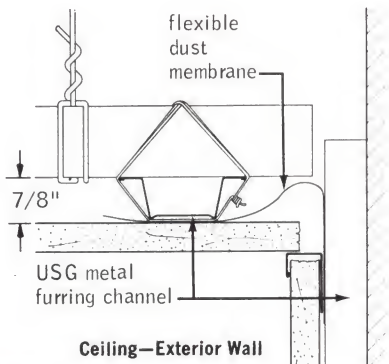
Partition—Structural Ceiling



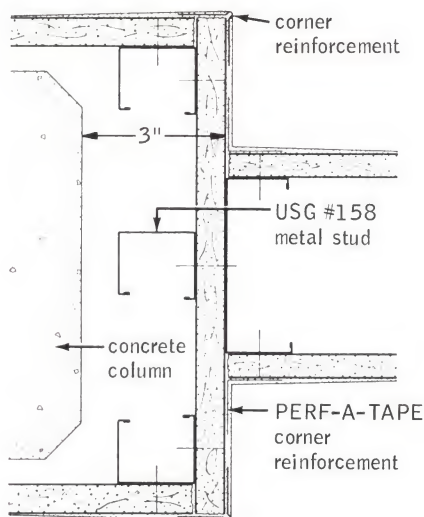
Partition—Exterior Wall—Attach metal stud to exterior wall to position partition. Attach wallboard only to second metal stud erected vertically no more than 6" from wall. Allow at least $\frac{3}{8}$ " clearance between partition panel and wall. Caulk as required.



Furring—Exterior Wall—Allow $\frac{1}{4}$ " minimum clearance between wallboard trim and intersecting exterior wall or column. Caulk as required.

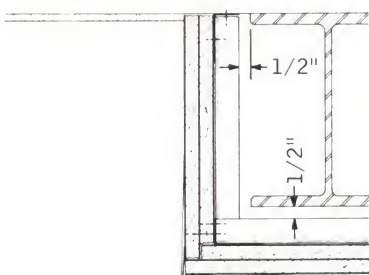


Ceiling—Exterior Wall—On suspended or furred ceilings, locate supports for wallboard within 6" of abutting surfaces but do not allow main runner or furring channels to be let into or come into contact with abutting masonry walls.

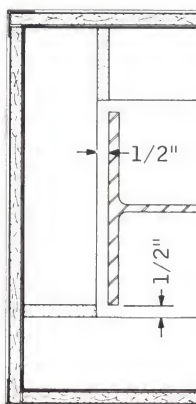


Partition—Column

Partition—Column—Fur wallboard away from concrete column using vertical metal studs. Attach stud in intersecting partition to stud within free-standing furring.



Beam Fireproofing



Column Fireproofing

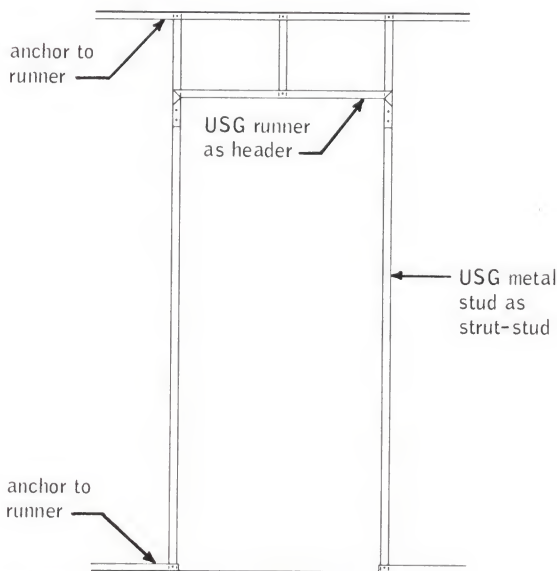
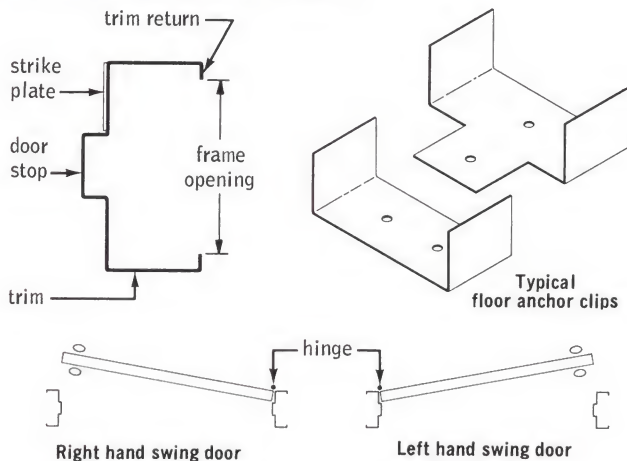
Beam and Column Fireproofing—Allow $\frac{1}{2}$ " minimum clearance between steel beam flanges and drywall fireproofing construction.

door frame and window installation

Metal door and borrowed light frames used with SHEETROCK Wallboard partitions must be constructed and installed properly to prevent twisting or movement. Basic considerations for satisfactory performance are:

1. Frames must be securely anchored. If frames are free to twist upon impact, or trim returns are free to vibrate, movement of the frame will tend to pinch the wallboard face paper and crush the core, resulting in unsightly cracks in the finish and loose frames.
2. Partition must fit securely in frame so that wall and frame work as a unit. Impact stresses on frame will then be dissipated over entire partition surface and local damage minimized.
3. The frame must have an opening between trim returns that accurately fits the overall thickness of the partition. The face layer wallboard should be enclosed by the trim and not butted against the trim return. This frame opening measurement is critical, as too large a tolerance between wallboard and trim return will cause door frame to twist and vibrate against the wallboard. Too small a tolerance will prevent wallboard from fully entering frame opening; as a result, the door frame will not be held securely by the partition.
4. Door closers and bumpers are required on all doors where the door weight (including attached hardware) exceeds 50 lbs.
5. Door and borrowed light frames are not recommended when partitions are used as party walls, since the sound control characteristics will be reduced.
6. One-piece metal door and borrowed light frames should be formed from 18-ga. steel minimum, shop primed. Floor anchor plates for door frames should be 14-ga. steel minimum, designed with two anchor holes to prevent rotation, and shop welded to trim flanges to dampen door impact vibrations. Floor anchorage should be by two power-driven anchors or equivalent per plate. Jamb anchor clips should be formed of 18-ga. steel minimum, welded in the jamb and head, and screw-attached to the stud. A minimum of three anchor clips per jamb is recommended with the top clip located near the frame head (see details below).
Door frame struts, when required, should be $\frac{1}{4}$ " minimum thickness, hot rolled steel bar stock and of sufficient width to completely fill doorstop void, anchoring jamb securely. All door frame struts should be supplied as an integral part of the frame.
7. All one-piece metal door and borrowed light frames should be spot grouted at the jamb anchor clips, after the coreboard or stud is installed but before the wallboard is erected. A grouting of DURABOND 90 or USG Ready-Mixed Joint Compound should be applied just before the face layer is inserted to securely adhere the wallboard to the frame.
8. When installing a three-piece knocked down door frame, allow space in the rough framing for the adjustment shoes in the frame.
9. When ordering metal door frames, the many factors which must be considered include: the gauge of the frame; width and

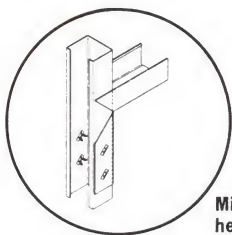
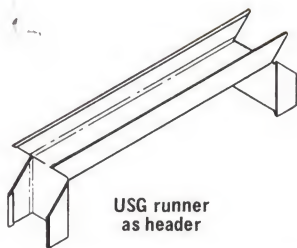
height of door; swing direction of door; type and thickness of door; and overall thickness of partition.



INSTALLATION

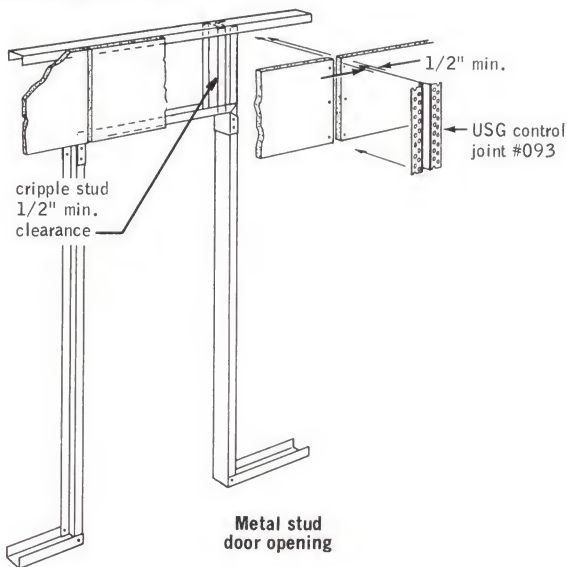
Rough Framing

Door and borrowed light frames should be rough framed with metal studs and runners. Position floor to ceiling height strut-studs vertically adjacent to frames and anchor securely to top and bottom runners with the USG Metal Lock Fastener. Fabricate

Mitered
head
spliceUSG runner
as header

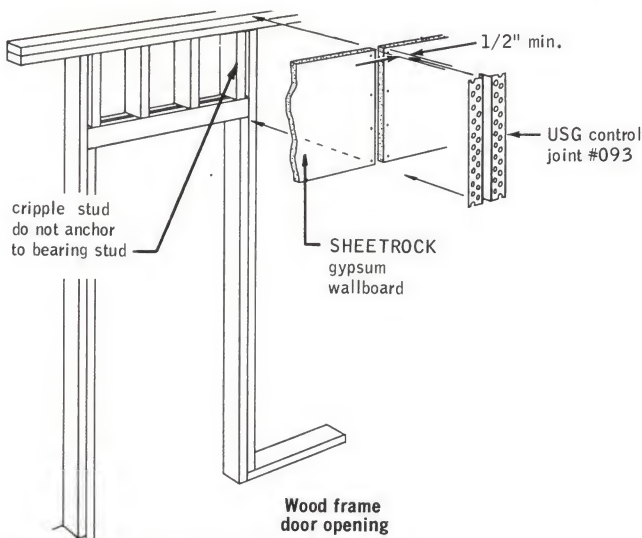
sill and header sections from USG Metal Runners and install over less-than-ceiling-height door frames and above and below borrowed light frames. Fabricate from a cut-to-length section of runner with flanges slit and web bent to allow flanges to overlap adjacent vertical strut-studs, and securely attach to strut-studs with the USG Metal Lock Fastener (see detail). For frames with jamb anchor clips, fasten clips to strut-studs with two $\frac{3}{8}$ " USG Brand Screws Type S-12, pan head. Install cut-to-length studs in the center above the door opening and above and below borrowed light openings spaced no greater than 24" o.c.

Where control joints in header panels are required, install cripple studs $\frac{1}{2}$ " away from strut-studs but do not attach cripple to runners or strut-studs.



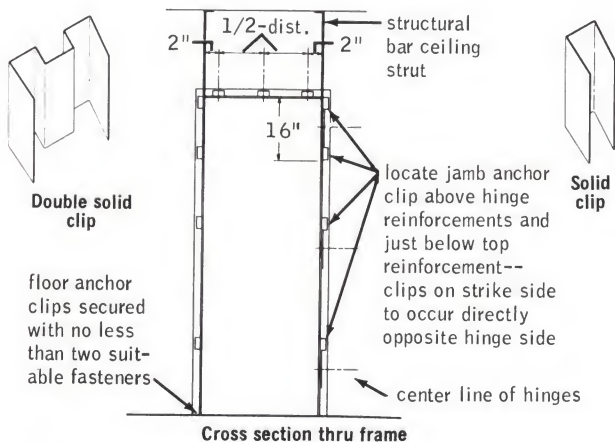
Three-Piece Door Frames

1. Install rough framing (described above) for the opening size specified by the door frame manufacturer. Apply wallboard and control joints as required by specifications.
2. Install jamb and header sections over wallboard according to manufacturer's directions.



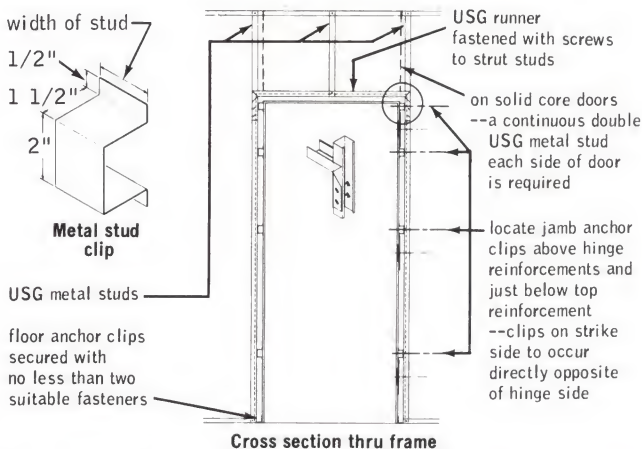
Wood Frame Door Openings

Install additional cripple studs above header and $\frac{1}{2}$ " from bearing studs where control joints are required. Do *not* anchor cripple stud to bearing stud.

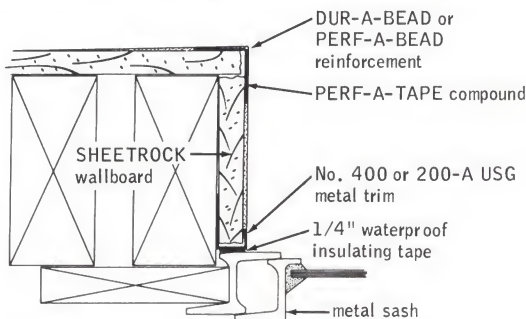


One-Piece Door Frames

Door frame struts are recommended for use with USG Solid and Double Solid drywall partitions. Struts should be $\frac{1}{4}$ " minimum thickness, hot rolled steel bar stock, and of sufficient width (minimum 1") to completely fill door stop void and anchor jamb securely. Struts should be welded to jambs a minimum of 16" below head and extend upward to the slab or a structural member where they are securely fastened.



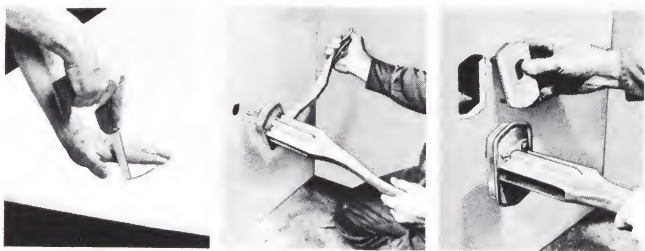
On the USG Studwall, Ribwall and Metal Stud drywall partitions, a USG Metal Stud acting as a strut-stud should be located adjacent to the jamb. Fasten jamb anchor clips to strut-studs with two $\frac{3}{8}$ " USG Brand Screws Type S-12 pan head.



Metal Windows

In conjunction with metal window installation, builders often allow $\frac{1}{8}$ " to $\frac{1}{4}$ " space between metal windows and end of SHEETROCK Wallboard. This space is filled with caulking compound prior to painting. This method of installation allows moisture from condensation on metal window frame to penetrate into end of gypsum wallboard and, after a year or more, may result in paper delamination from the core. By placing No. 400 or No. 200-A USG Metal Trim casing between window and board, protection will be provided against moisture penetrating the wallboard core.

Waterproof insulating tape, $\frac{1}{32}$ " thick and $\frac{1}{4}$ " wide, is used to separate metal sash and metal trim and will provide some measure of insulation between the two different metals. Direct contact of an aluminum frame and metal trim in the presence of condensation moisture may cause an electrolytic deterioration of aluminum frame.



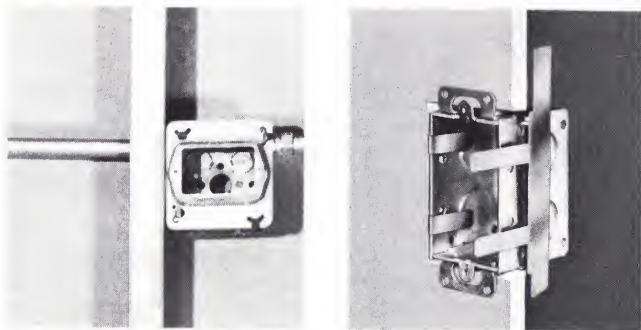
fixture installation

ELECTRICAL FIXTURES

After electrical services have been roughed in and before wall-board is installed, cut necessary openings in coreboard, gypsum studs and openings in face layers of SHEETROCK to accept rigid conduct, flexible cable, electrical switches, outlet boxes, etc. To locate exact position of cut-out, hold SHEETROCK panel in place over electrical outlet. Tap with a rubber mallet or place a wooden block on the wallboard and tap on block around fixture with a hammer. The indentation on the wallboard is the guide for cutting. Remove the face panel and cut out opening with a keyhole saw or with specially designed cutting tools which produce die cut openings of the exact shape needed for various types of outlets. Erect panel in the usual manner.

The depth of electrical boxes is limited in certain partitions (see Chapter 4—Systems, for details).

Caulking—Where the partition is used as a sound barrier, apply USG Acoustical Sealant to the backs of electrical boxes and around all boxes to seal the cut-out. Eliminate cutting holes back to back and adjacent to each other. Electrical boxes having a dry-wall ring or device cover for use as a stop in caulking are recommended.



FIXTURE ATTACHMENT

USG Drywall Partitions provide suitable anchorage for most types of fixtures normally found in residential and commercial construction. To insure satisfactory job performance it is important to have an understanding of particular fixture attachment so that sound control characteristics will be retained and attachment will be within the allowable load-carrying capacity of the construction.

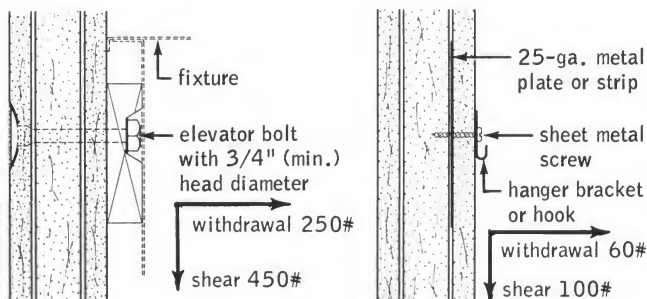
In wood frame construction, fixtures are usually attached directly to the framing or to blocking or supports attached to the framing. Blocking or supports should be provided for plumbing fixtures, towel racks, grab bars and similar items. Single or double layer SHEETROCK Wallboard is not designed to support loads imposed by these items without additional support to carry the main part of the load.

The attachment of fixtures to sound barrier partitions may impair the sound control characteristics. Only lightweight fixtures should be attached to resilient wall surfaces constructed with the RC-1 Resilient Channel unless special framing is provided. Refrain from attaching fixtures to party walls so as to provide a direct path for sound to flow. Allow a space between the back of the fixture attachment and septum barrier in the USG Triple Solid Drywall Partition. Holes cut in sound isolating partitions should be caulked to seal leaks around fixtures.

Wallboard used in the ceiling is not designed to support light fixtures or troffers, air vents or other equipment. Separate supports should be provided.

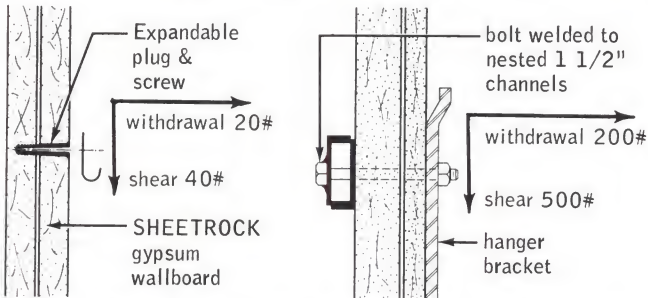
FIXTURE ATTACHMENT TYPES

To provide information for proper construction, an investigation of loading capacities of various fasteners and fixture attachments used with USG Drywall Partitions was conducted at the U.S.G. Research Center. The following fasteners or attachments were tested.



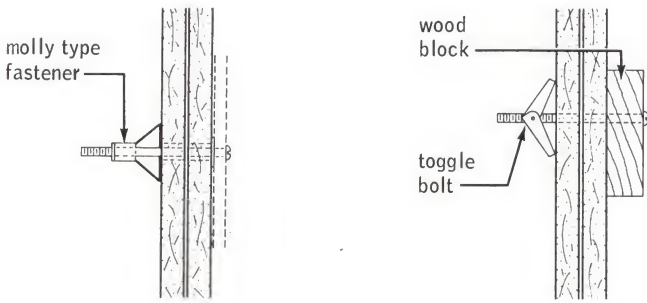
3/8" Elevator Bolt—a flat, plain, circular countersunk head bolt with a square neck to prevent rotation. Head diameter is slightly over three times that of bolt body. The large low head shape provides a flush wide bearing connection. Suitable in all laminated gypsum partitions for medium or heavy fixtures.

No. 8 Sheet Metal Screw—driven into 25 ga. minimum sheet metal plate or strip laminated between face board and core-board or gypsum studs or ribs in laminated gypsum partitions. Also may be inserted through SHEETROCK Wallboard into a USG Metal Stud. Ideal for pre-planned light fixture attachment.



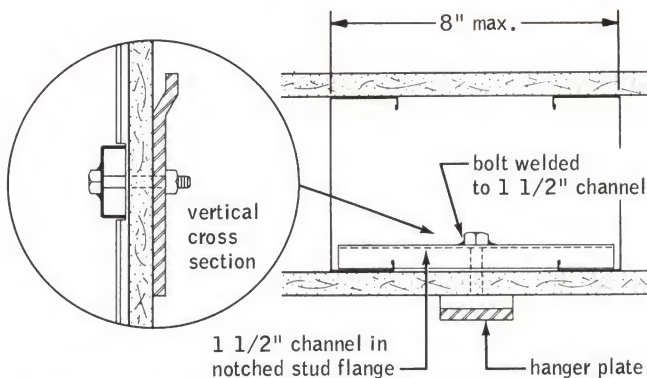
Plastic Expansion Plug—No. 8 sheet metal screw into 4-12 plastic plug. This anchor consists of a plastic tubular shield split at one end. A threaded hole in the center is provided to receive sheet metal screw. Annular ribs are provided on outside of plug to assure a positive grip in SHEETROCK. As screw is inserted, split end of plug expands (rear of plug) and holds assembly in place. Suitable for attaching lightweight fixtures in all partitions.

Bolt and Nested Channels—Bolt welded to nested 1½" channels for use in mounting hanger brackets for heavy fixtures. Suitable for use in USG Double Solid and Triple Solid Gypsum Drywall Partitions, provided that fixture attachments do not contact septum sound barrier.



Molly Bolt—¼" Molly Bolt installed in SHEETROCK Wallboard only. One advantage of this type fastener is that threaded section remains in wall when screw is removed. Also, wide spread spider support formed by the expanded anchor spreads load against wall material, increasing load capacity.

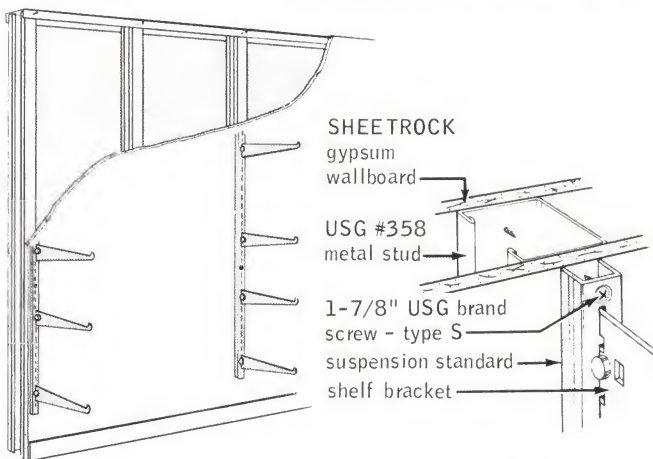
Toggle Bolt—¼" Toggle Bolt installed in SHEETROCK only. One disadvantage of toggle bolt is that when bolt is removed, wing fastener on back will fall down into a hollow wall. Another disadvantage is that a large hole is required to allow wings to pass through wall facings.



Bolt and 1½" Channel—Bolt welded to single 1½" channel and inserted in notches cut in USG Metal Stud for use in mounting hanger brackets for heavy fixtures. Suitable for use in USG Metal Stud Drywall Partition with No. 358 Metal Studs.

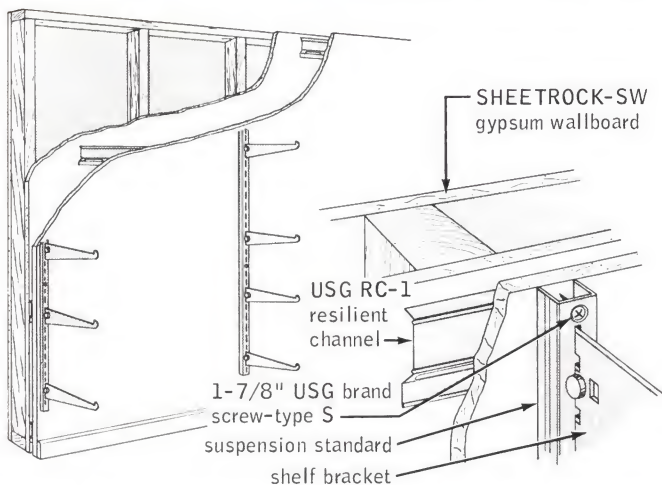
USG Shelf-Wall Systems—provide load-carrying wall for shelving in stores, offices, schools and other applications where required. Incorporating simple, quickly erected, economical metal or wood stud components with Garco shelf brackets, standards and accessories, these systems offer all the advantages of drywall construction plus structural strength for shelving and merchandise.

In the metal-framed assembly, 3⅝" USG Metal Studs spaced no more than 24" o.c. are securely fastened to floor and ceiling run-



ners and surfaced with either single or double layer SHEETROCK wallboard. Slotted standards are screw-attached to studs or steel reinforcing inserted between layers.

In the resilient wood-framed assembly, RC-1 Resilient Channels,



spaced 24" o.c. are screw-attached to wood studs and faced with wallboard. Slotted standards are screw-attached to the resilient channels.

The systems provide a load-carrying partition but with metal studs, the partition is not structurally load-bearing. Limiting height: 16'. For specific system construction and load characteristics of shelf brackets see U.S.G. Bulletin WB-938.

FASTENER LOADING

Test results shown in following tables are recommended allowable loads under each condition of loading for partition system indicated. Recommended allowable load is an average of number of test loads applied to each fastener or attachment with a safety factor included. Caution must be exercised when using these recommended allowable loads. Withdrawal and shear tests were conducted on these fasteners because they are most extreme values that could be encountered in fixture attachment. However, there is rarely a true withdrawal or a true shear load on any fixture; it is usually a combination of the two. A hand rail would usually be subjected to a greater withdrawal load than a shearing load, but a wall cabinet more of a shearing load than a withdrawal load. This type of consideration must be made before a safe load can be determined for each application.

Fasteners were tested on small samples of partitions; therefore, consideration must be given when used with full size partitions. If, for example, an elevator bolt has been found to support a 250-lb. load for a given condition, a 750-lb. fixture would require three closely spaced elevator bolts. Although each bolt can safely carry 250 lbs., the partition is not necessarily capable of supporting 750 lbs. Spacing and grouping of each type fastener becomes a definite consideration. Tests were conducted on a short term basis and vibration (especially applicable to friction type fasteners), wetting, and long term installation considerations were not examined.

2" Solid Drywall Partition

Type Fastener or Attachment	Allowable Withdrawal Resistance—Lbs.	Allowable Shear Resistance—Lbs.
1. $\frac{3}{8}$ " Elevator Bolt	250	450
2. No. 8 sheet metal screw into 25-ga. sheet metal plate	60	100
3. No. 8 sheet metal screw in plastic plug	20	40

Double Solid Drywall Partition

Type Fastener or Attachment	Allowable Withdrawal Resistance—Lbs.	Allowable Shear Resistance—Lbs.
1. No. 8 sheet metal screw into 25-ga. sheet metal plate	60	100
2. Heavy fixture attachment, using two $\frac{5}{16}$ " bolts	200	500
See Footnote*	Allowable Static Load—lbs.	Allowable Impact Load—ft. lbs.
3. Plumber's (Hanger) Bracket, using four $\frac{5}{16}$ " bolts	350	75

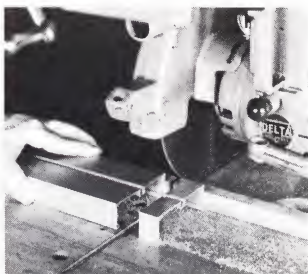
*Plumber's Bracket—two 4'x8' panels were constructed, and a simulated sink was attached to a plumber's bracket. Static and impact loads were applied to sink 18" from face of wall. Deflection readings were recorded for panel tested with static loads. A 60-lb. bag was dropped on a simulated sink at various heights, 18" from face of panel.

No. 358 Metal Stud Drywall Partition

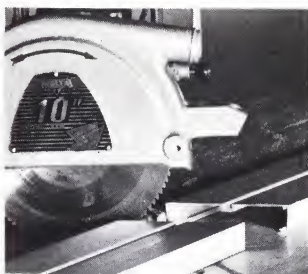
Type Fastener or Attachment	Allowable Withdrawal Resistance—Lbs.	Allowable Shear Resistance—Lbs.
1. No. 8 sheet metal screw through SHEETROCK into metal stud	50	80
2. $\frac{1}{4}$ " molly bolt into $\frac{1}{2}$ " SHEETROCK Wallboard only	35	80
3. $\frac{1}{4}$ " toggle bolt into $\frac{1}{2}$ " SHEETROCK only	40	60
4. No. 8 sheet metal screw in plastic plug	20	40
5. Heavy fixture attachment	70	250

fabricating aluminum parts

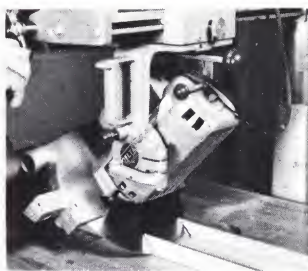
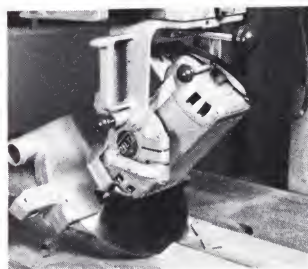
Cutting to length—Cut USG aluminum components to length accurately using a radial or bench-type power saw (Fig. A). Automobile motor oil will serve effectively as a lubricant. Hand sawing with a hack saw or power-driven sabre saw will not produce sufficiently accurate results.

**A**

Mitering—Miter cutting is accurately performed simply and easily with a power saw (Fig. B).

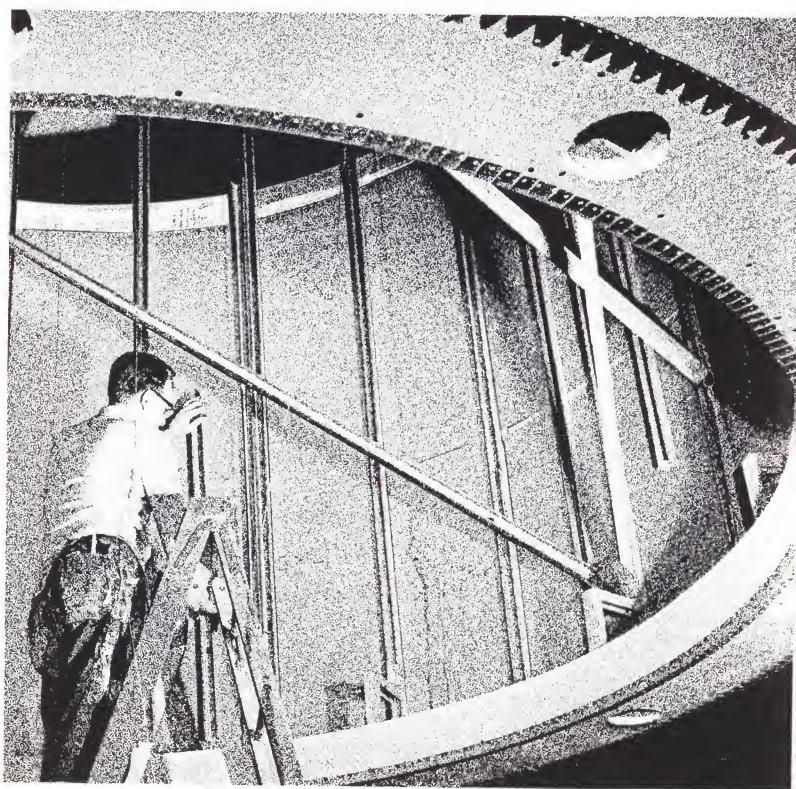
**B**

Coping Corners—Coping is required to form a corner in the rail cap or aluminum base plates without cutting through the face. Make a 45° cut to the point where the face will bend (Fig. C). Turn the part around and make another 45° cut to meet the first cut, slightly scoring underside of face to aid in bending (Fig. D). Heat the scored underside of face with a propane torch and bend to form the 90° corner.

**C****D**

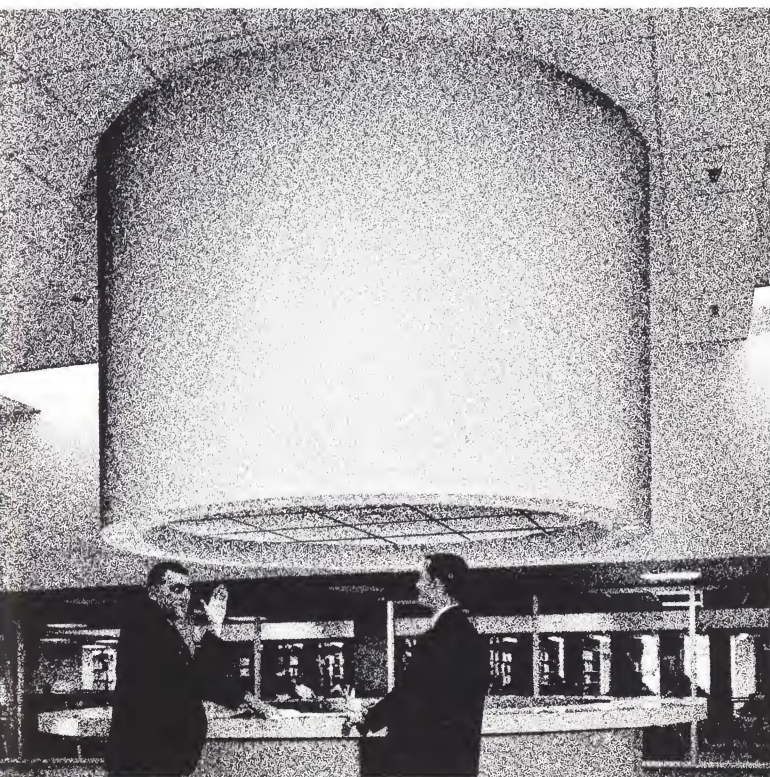
chapter 4

systems



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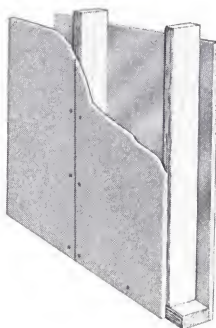
U.S.G. drywall systems

U.S.G. gypsum wallboards and accessories are perfectly matched to the wall and ceiling assemblies which have won for drywall a solid, fast-growing share of the apartment and non-residential construction market. U.S.G. has pioneered the development of such systems, and has perfected dozens of product applications specifically for this use.

These systems add new advantages to those which have enabled drywall to dominate residential construction. In high-rise and multiple-unit structures, drywall systems outperform other types in *light weight, speed of installation, space saving, over-all economy, movability, and predecorated or easily decorated surfaces*. Through advanced "package" design, they now also meet most requirements—usually No. 1 in importance—for *fire resistance* and *sound transmission loss*. They should not be used where exposed to abnormal moisture or excessively high humidity or temperature.

Major U.S.G. partition, ceiling, furring, and fireproofing systems are outlined on the following pages. Each system is described and illustrated in detail, with step-by-step instructions to simplify construction. Recommended applications and limitations are given together with a full list of materials needed. See Chapter 2 for complete information on products mentioned. See Chapter 3 for installation methods to use in applying various types of wallboard, fasteners, metal accessories, caulking and joint treatment. For complete architectural specifications and details see U.S.G.'s current Architectural Technical Literature—specifically designed for architects' use.

wood stud partitions



single layer—wood stud partitions

In this basic load-bearing drywall partition SHEETROCK SW Gypsum Wallboard is either horizontally or vertically applied directly to conventional 2x4 wood studs. Attachment is by nails, screws or the adhesive nail-on method. Maximum stud spacing for $\frac{3}{8}$ " SHEETROCK is 16" o.c.; for $\frac{1}{2}$ " and $\frac{5}{8}$ " SHEETROCK, 24" o.c.

To upgrade job quality, Back-Blocking, Double Nailing and Floating Interior Angles may be used. Joints and fasteners are finished with a U.S.G. joint system.

The use of predecorated TEXTONE Vinyl or ULTRAWALL Panels eliminates joint treatment and decorating. With Insulating (foil back) SHEETROCK Wallboard the system is effective as a vapor barrier, offers significant insulating value, and provides economical furring for exterior walls.

ADVANTAGES

Fire Resistance—1-hour rating with $\frac{5}{8}$ " SHEETROCK SW FIRECODE Wallboard.

Light Weight—6 to 7 psf for conventional assemblies.

Versatile—Widely accepted for interior partitions in all types of residential and commercial buildings with wood framing.

Economical—Quickly erected using low-cost materials.

Sound Control—STC 34 with $\frac{5}{8}$ " thick wallboards.

MATERIALS

1. Gypsum Board—48" wide—($\frac{3}{8}$ " ($\frac{1}{2}$ " ($\frac{5}{8}$ " thick Tapered Edge SHEETROCK SW (Regular) or (Insulating—foil back); ($\frac{1}{2}$ " ($\frac{5}{8}$ " thick SHEETROCK SW FIRECODE; $\frac{3}{8}$ " thick ULTRAWALL Panels (finish); $\frac{1}{2}$ " thick TEXTONE Vinyl Panels (finish); ($\frac{1}{2}$ " ($\frac{5}{8}$ " thick SHEETROCK W/R Wallboard—lengths as required.

2. Joint Treatment—Select a U.S.G. Joint System.

3. Adhesive

—(for Back-Blocking System)—PERF-A-TAPE Joint Compound-Taping.

—(for Adhesive Nail-On Board Application)—DURABOND 200 or 300 Stud Adhesive.

4. Fasteners

—Screws— $1\frac{1}{4}$ " USG Brand Screw Type W.

—Nails (choose type from Chapter 2).

5. Metal Trim

—(choose type from Chapter 2).

6. TEXTONE Metal Moldings (for TEXTONE Vinyl and ULTRAWALL Panels)—to match finishes as required.

7. Corner Bead—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement (choose type from Chapter 2).

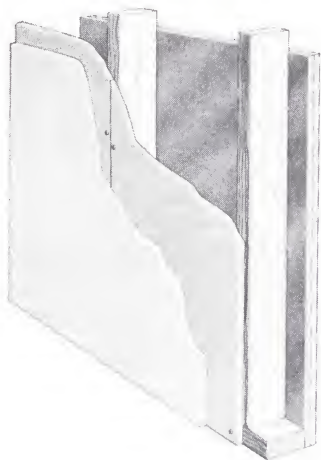
8. Wallboard Sealant (for SHEETROCK W/R Wallboard)—SHEETROCK Brand W/R Sealant.

9. THERMAFIBER Insulating Wool Blankets (choose size from Chapter 2).

10. USG Control Joint No. 093.

INSTALLATION

Install wallboard, fasteners, insulating wool, metal accessories and joint treatment according to methods shown in Chapter 3.



double layer—wood stud partitions

In these load-bearing partitions a base layer of SHEETROCK SW Wallboard, BAXBORD Gypsum Backing Board or USG Wood Fiber Sound Deadening Board is nailed or screwed to 2x4 wood studs 16" or 24" o.c. The SHEETROCK Wallboard face layer is job-laminated to the base layer. Surfaces are treated with a U.S.G. Joint System and decorated—these steps unnecessary when pre-decorated TEXTONE Vinyl or ULTRAWALL Panels are used.

In double layer systems the reduced use of face layer fasteners results in finer appearance. To further reduce the possibility of nail popping and angle cracking, see *floating interior and exterior angle* construction (see details, Chapter 3). Greater strength and higher fire and sound resistance are also found in these assemblies.

FIRE RATED CONSTRUCTION

2 layers $\frac{5}{8}$ " SHEETROCK SW FIRECODE Gypsum Wallboard each side of 2x4 wood studs 16" o.c.; base layer vertically applied and attached with 6d nails 6" o.c.; face layer horizontally applied and laminated to base; all joints staggered; joints finished.

Other double layer assemblies providing different combinations of sound and fire resistance are available (see Chapter 5).

ADVANTAGES

2-hour Fire Rating with double layer $\frac{5}{8}$ " thick wallboard.

Finer Appearance—Fewer chances for fastener defects; call-backs reduced; easily decorated.

Fast Erection—cuts building time, permits earlier occupancy.

MATERIALS

1. Faceboards—48" wide—($\frac{3}{8}$ " ($\frac{1}{2}$ " ($\frac{5}{8}$ ") thick Tapered Edge SHEETROCK SW; ($\frac{1}{2}$ " ($\frac{5}{8}$ ") thick SHEETROCK SW FIRECODE "C"; $\frac{3}{8}$ " thick ULTRAWALL panels (finish); $\frac{1}{2}$ " thick TEXTONE Vinyl Panels (finish); ($\frac{1}{2}$ " ($\frac{5}{8}$ ") thick SHEETROCK W/R Gypsum Wallboard; $\frac{5}{8}$ " thick SHEETROCK W/R FIRECODE "C" Gypsum Wallboard—lengths as required. *Note: Use only $\frac{5}{8}$ " thick wallboard for fire-rated construction.*

2. Backing Board—48" wide—($\frac{3}{8}$ " ($\frac{1}{2}$ " ($\frac{5}{8}$ ") thick (Tapered Edge) (Insulating) SHEETROCK SW; ($\frac{1}{2}$ " ($\frac{5}{8}$ ") thick SHEETROCK SW FIRECODE; ($\frac{3}{8}$ " ($\frac{1}{2}$ " ($\frac{5}{8}$ ") thick BAXBORD Gypsum Backing Board; ($\frac{1}{2}$ " ($\frac{5}{8}$ ") thick BAXBORD FIRECODE; lengths as required. *Note: Use only $\frac{5}{8}$ " thick wallboard for fire-rated construction.*

3. Joint Treatment—Select a U.S.G. Joint System.

4. Laminating Adhesive—PERF-A-TAPE Joint Compound-Taping (for fire-rated construction) or DURABOND 600 Liquid Contact Adhesive.

5. Fasteners

—Screws— $1\frac{1}{4}$ " USG Brand Screw Type W.

—Nails (choose type from Chapter 2).

—Staples—16 ga. flat galvanized wire, $\frac{1}{2}$ " wide, (1") ($1\frac{1}{8}$ ") ($1\frac{1}{4}$ ") long with divergent points.

6. Metal Trim—(choose type from Chapter 2).

7. TEXTONE Metal Moldings (for TEXTONE Vinyl and ULTRAWALL Panels)—to match finishes as required.

8. Corner Bead—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement (choose type from Chapter 2).

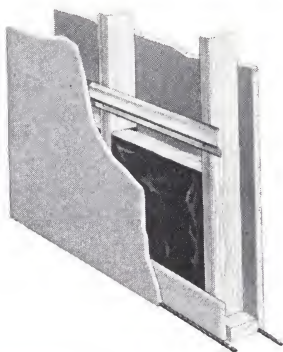
9. Wallboard Sealant (for SHEETROCK W/R Wallboard)—SHEETROCK Brand W/R Sealant.

10. USG Control Joint No. 093.

11. Acoustical Caulking.

INSTALLATION

Install wallboard, fasteners, metal accessories, caulking and joint treatment according to methods described in Chapter 3.



resilient channel— wood stud partitions

The resilient attachment of wallboard to wood studs with the RC-1 SHEETROCK Resilient Channel provides excellent sound isolation—equal to the best direct attachment systems—at lower cost. The RC-1 Resilient Channels are attached 24" o.c. at right angles to the studs with nails or screws; wallboard is screw-attached with 1" USG Brand Hi-Lo Screws Type S.

FIRE AND SOUND RATED CONSTRUCTION

RC-1 Channels applied with 1¼" USG Brand Screws Type W or 6d nails to one side of 2x4 wood studs 16" o.c.; ⅝" SHEETROCK SW FIRECODE face layers attached to channels one side with 1" Type S screws 12" o.c., applied direct to studs other side with 1¼" Type W screws 12" o.c.; butt end joints floated and backed with RC-1 Channels; 3" THERMAFIBER Insulating Wool Blankets between studs; plates and perimeter caulked; joints finished.

ADVANTAGES

1-hour Fire Rating with construction above.

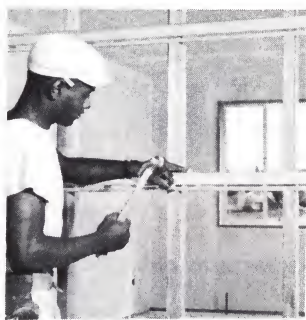
STC 52—the best value for wood stud party walls.

Economy—Only three basic components required—resilient channels, drywall screws and wallboard. These simple parts erect quickly, to offer low-cost party walls.

MATERIALS

- 1. Gypsum Board**—48" wide—½" or ⅝" thick Tapered Edge Regular SHEETROCK SW or SHEETROCK SW FIRECODE Wallboard—lengths as required.
- 2. Resilient Channels**—RC-1 SHEETROCK Resilient Channels.
- 3. Fasteners**
 - Screws—1" USG Brand Hi-Lo Screws Type S, 1¼" USG Brand Screws Type W.
 - Nails—6d cement coated cooler.
- 4. Insulation**—THERMAFIBER Insulating Blankets, 3"x15"x96".

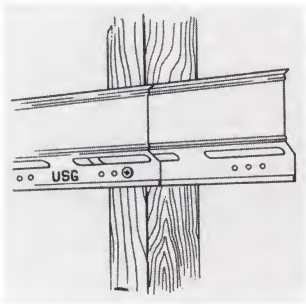
5. **Joint Treatment**—Select a U.S.G. Joint System.
6. **Adhesive**—(for Back-Blocking)—PERF-A-TAPE Joint Compound-Taping.
7. **Metal Trim**—(choose type from Chapter 2).
8. **Corner Bead**—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement (choose type from Chapter 2).
9. **USG Control Joint No. 093.**
10. **Acoustical Caulking.**



INSTALLATION

Resilient Channels—attach RC-1 SHEETROCK Resilient Channels at right angles (horizontally) to wood studs. Use 1¼" USG Brand Screws Type W or 6d cement coated cooler nails driven through pre-punched holes in channel flange. With extremely hard lumber for studs, 7/8" or 1" Hi-Lo Type S screws may be used. Fasten channel to stud at each intersection.

Position channel with nailing flange down. Locate channels 24" up from floor, within 6" of the ceiling line and no more than 24" o.c. Extend channels into all corners and fasten to corner framing. Splice channel directly over studs by nesting the channels and fastening both flanges to the support.



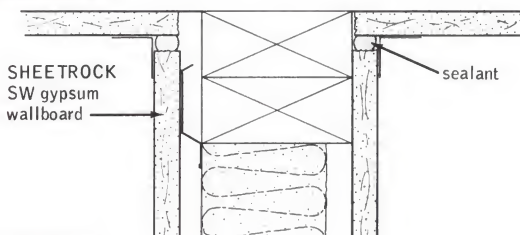
Wallboard—Apply wallboard horizontally with long dimension parallel to resilient channels. Attach wallboard with 1" USG Brand Hi-Lo Screws Type S spaced 12" o.c. along with channels. Center horizontal abutting edges of wallboard over screw flange.

of channel, and screw-fasten each edge. For fire-rated construction, float vertical butt joints between studs and back joint with a length of RC-1 channel. Where fire rating is not required, board may be applied with long dimension vertical.

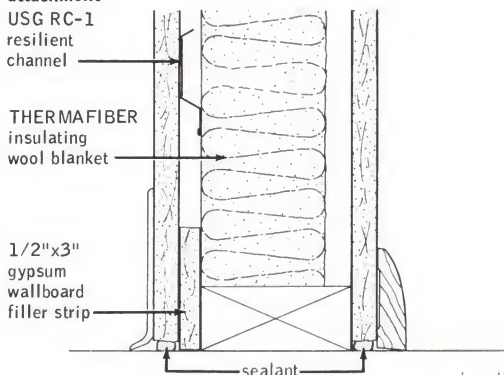
Insulating Wool—Install 3" THERMAFIBER Insulating Wool Blanket as directed in Chapter 3.

Finishing Partition—Apply metal trim and corner bead, caulk perimeter, treat all joints, fastener heads and trim as directed in Chapter 3.

ceiling attachment

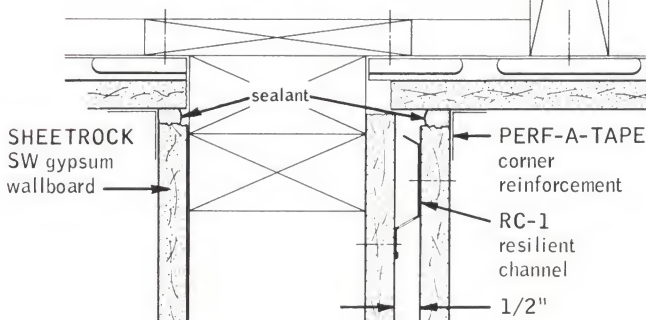


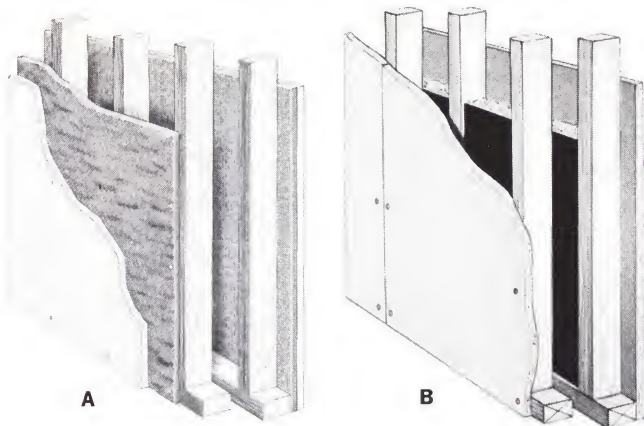
floor attachment



wood joist

Resilient ceiling attachment





staggered stud partitions

The U.S.G. Staggered Stud systems offer excellent sound isolation and fire protection for drywall wood frame partitions used as party walls. The load-bearing framing consists of 2x3 wood studs 16" o.c., staggered on opposite sides of the partition and attached to separate 2x3 plates spaced 1" apart. With 5/8" SHEETROCK SW FIRECODE nailed to a base layer of sound deadening board, this system provides optimum sound isolation, STC 53, and a 1-hour fire resistance rating. Where a fire rating is not required, single layer 5/8" SHEETROCK SW Wallboard and 2" THERMAFIBER Blankets between studs on one side will give the best value in this type party wall.

FIRE AND SOUND RATED CONSTRUCTION

Construction (A): Two rows 2x3 staggered wood studs 16" o.c. on separate plates 1" apart; base layer of 1/2" USG Wood Fiber Sound Deadening Board applied vertically both sides; base layer attached with 6d coated nails 12" o.c. around perimeter and at quarter and mid-points in field of panel; 5/8" SHEETROCK SW FIRECODE Wallboard face layer applied horizontally both sides and attached with 7d coated nails 7" o.c.; plates and perimeter caulked; joints finished. **Construction (B):** Staggered studs same as in (A); 5/8" SHEETROCK SW Wallboard face layer applied vertically both sides and attached with 1/4" USG Brand Screws Type W spaced 16" o.c.; 2" THERMAFIBER Insulating Wool Blankets inserted between studs on one side; perimeter caulked; joints finished.

ADVANTAGES

Sound Control—STC 53 with Construction (A) and STC 51 with (B)—ideal for party walls.

Fire Resistance—1-hour rating with (A).

MATERIALS

1. **Faceboards**—48" wide— $\frac{5}{8}$ " thick Tapered Edge SHEETROCK SW or SHEETROCK SW FIRECODE Wallboard—lengths as required.
2. **Backing Board**— $\frac{1}{2}$ " USG Wood Fiber Sound Deadening Board, 48" wide—lengths as required.
3. **Fasteners**—
 - Screws— $1\frac{1}{4}$ " USG Brand Screw Type W.
 - Nails—(for Construction (A) 6d coated (for base layer) 7d coated (for face layer).
4. **Insulation**—THERMAFIBER Insulating Blankets, 2"x15"x96".
5. **Metal Trim**—(choose type from Chapter 2).
6. **Corner Bead**—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement.
7. **Joint Treatment**—Select a U.S.G. Joint System.
8. **Acoustical Caulking.**

INSTALLATION

Install wallboard, insulating wool, sound deadening board, fasteners, metal accessories, caulking and joint treatment according to methods described in Chapter 3.

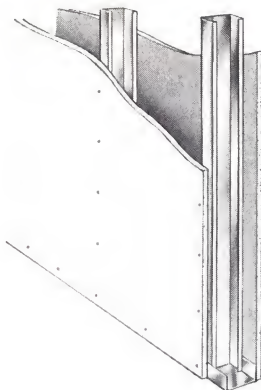
USG metal stud partitions

USG Metal Stud Partitions are lightweight, non-load bearing assemblies that have won wide acceptance for their low cost, speedy erection, fire and sound resistant properties. They consist of steel channel studs, set in floor and ceiling runner tracks and faced each side with one or two layers of SHEETROCK SW Gypsum Wallboard, screw-attached. Screw heads and joints are finished with joint treatment.

Studs, available in four widths, are used with $\frac{1}{2}$ " or $\frac{5}{8}$ " SHEETROCK Wallboard facings applied horizontally or vertically depending on job layout, sound and fire resistance required.

Maximum stud spacing: 24" o.c. Limiting heights: $1\frac{5}{8}$ " metal stud, 9'; $2\frac{1}{2}$ " stud, 12'; $3\frac{5}{8}$ " stud, 16'; 4" stud, $17\frac{2}{3}$ "; 6" stud, 16'.

Metal stud partitions offer some of drywall's best performances. Depending on the construction used (see details below), metal stud assemblies are ideal space-saving dividers within units, economical corridor partitions, or highly sound-resistant party walls.



single layer—metal stud partition

These versatile systems offer a practical method of partitioning for corridors, or within units. Screw fasteners assure positive attachment of wallboard, freedom from nail "pops."

FIRE AND SOUND RATED CONSTRUCTION

Construction (A): 1/2" SHEETROCK SW FIRECODE "C" Wallboard face layers vertically applied and screw-attached to No. 212 (2 1/2") Metal Studs 24" o.c. in runners; 7/8" USG Brand Hi-Lo Screws Type S spaced 8" o.c. at vertical joints and 12" o.c. in field of board; 1 1/2" THERMAFIBER Sound Attenuation Blankets in stud cavity; perimeter caulked; joints finished. **Construction (B):** 5/8" SHEETROCK SW FIRECODE Wallboard face layers vertically applied and screw-attached to No. 358 (3 5/8") Metal Studs 24" o.c. in runners; 1" USG Brand Hi-Lo Screws Type S spaced as in (A); perimeter caulked; joints finished. **Construction (C):** Same as (B) but with No. 158 (1 5/8") Studs in runners.

ADVANTAGES

Fire Resistance—1-hour rating for all constructions.

Sound Control—48 STC with Construction (A); 42 STC with (B); 38 STC with (C).

MATERIALS

1. **USG Metal Studs**—No. 158 (1 5/8"), 212 (2 1/2"), 358 (3 5/8"), 400 (4"), 600 (6").
2. **USG Runners**—No. 158 (1 5/8"), 212 (2 1/2"), 358 (3 5/8"), 400 (4"), 600 (6").
3. **Faceboards**—48" wide—(1/2") (5/8") thick Tapered Edge

SHEETROCK SW or ($\frac{1}{2}$ ") ($\frac{5}{8}$ ") thick SHEETROCK SW FIRECODE or FIRECODE "C" Wallboard—lengths as required.

4. Fasteners—USG Brand Hi-Lo Screws— $\frac{7}{8}$ " or 1" Type S, $\frac{3}{8}$ " Type S pan head.

5. Metal Trim—(choose type from Chapter 2).

6. Corner Bead—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement.

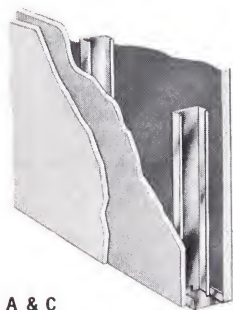
7. Joint Treatment—Select a U.S.G. Joint System.

8. Insulation—THERMAFIBER Sound Attenuation Blankets $1\frac{1}{2}$ " x 24" x 48".

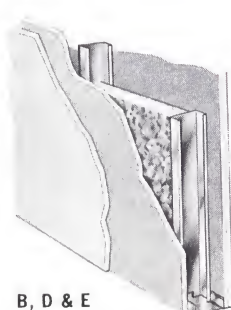
9. USG Control Joint No. 093.

10. Acoustical Caulking.

See page 165 for installation of system.



A & C



B, D & E

double layer—metal stud partition

These double layer systems are excellent for corridors and give the high STC value necessary for party walls.

FIRE AND SOUND RATED CONSTRUCTION

Construction (A): 2 layers $\frac{1}{2}$ " SHEETROCK SW FIRECODE "C" Gypsum Wallboard each side of No. 158 ($1\frac{5}{8}$ ") Metal Studs 24" o.c. in runners; base layer applied vertically with vertical joints staggered on opposite sides of the partitions; base layer screw-attached with $\frac{7}{8}$ " USG Brand Hi-Lo Screws Type S, 12" o.c. in the field and 8" o.c. staggered at vertical edges; face layer applied vertically with joints offset 12" from base layer; face layer screw-attached with $1\frac{5}{16}$ " Type S screws spaced 16" o.c.;

joints finished. **Construction (B):** Same as (A) but with No. 212 (2½") or No. 358 (3⅝") Metal Studs; THERMAFIBER Sound Attenuation Blankets stapled to back side of one base layer; face layer strip laminated with PERF-A-TAPE Joint Compound-Taping and 1½" Type G screws between studs; runners and perimeter caulked. **Construction (C):** Same as (A) but with 2 layers ⅝" SHEETROCK SW FIRECODE Gypsum Wallboard applied each side of No. 358 (3⅝") Metal Studs; face layer either screw-attached or laminated with PERF-A-TAPE Joint Compound-Taping; runners and perimeter caulked. **Construction (D):** Same as (C) but with 1½" THERMAFIBER Sound Attenuation Blankets stapled to back side of one base layer. **Construction (E):** 2 layers ½" SHEETROCK SW FIRECODE "C" applied vertically and screw-attached one side of No. 358 (3⅝") Metal Studs 24" o.c. in runners; 1 layer ½" SHEETROCK SW FIRECODE "C" Wallboard screw-attached to other side of studs; 1" THERMAFIBER Sound Attenuation Blankets stapled to back side of single layer; runners and perimeter caulked; joints staggered and finished.

ADVANTAGES

2-hour Fire Rating with Construction (A), (B) with 1" thick blankets, and (C).

Sound Control—55 STC (job test), 53 STC (lab. test) with Construction (D); 54 STC with 1½" thick blankets in Construction (B); 51 STC with (E); 46 STC with (C).

MATERIALS

1. USG Metal Studs—No. 158 (1⅝"), 212 (2½"), 358 (3⅝"), 400(4"), 600(6").

2. USG Runners—No. 158 (1⅝"), 212 (2½"), 358 (3⅝"), 400(4"), 600(6").

3. Faceboards—48" wide, ½" or ⅝" thick Tapered Edge SHEETROCK SW FIRECODE or FIRECODE "C" Wallboard or ½" thick TEXTONE Vinyl Panels—lengths as required.

4. Backing Board—½" or ⅝" thick, 24" or 48" wide BAXBORD FIRECODE, 8' lengths.

5. Fasteners—USG Brand Screws, ⅞", 1", 1-5/16" or 1⅝" Hi-Lo Type S, 1½" Type G, and ⅜" Type S pan head.

6. Adhesive—PERF-A-TAPE Joint Compound-Taping (for fire-rated construction) or DURABOND 500 Mastic Contact Adhesive.

7. Metal Trim—(choose type from Chapter 2).

8. Corner Bead—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement.

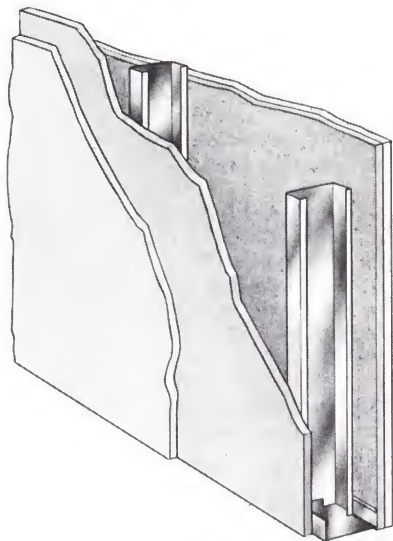
9. Joint Treatment—Select a U.S.G. Joint System.

10. Insulation—THERMAFIBER Sound Attenuation Blankets, 1" or 1½"x24"x48".

11. USG Control Joint No. 093.

12. Acoustical Caulking.

See page 165 for installation of system.



sound deadening board— metal stud partition

With USG Mineral Fiber Sound Deadening Board as a base layer these systems offer light weight and effective sound control for party and corridor walls at low cost.

FIRE AND SOUND RATED CONSTRUCTION

Construction (A): $\frac{5}{8}$ " SHEETROCK SW FIRECODE Wallboard face layer and $\frac{1}{2}$ " thick USG Mineral Fiber Sound Deadening Board base layer applied each side No. 358 ($3\frac{5}{8}$ ") Metal Studs 24" o.c. in runners; both boards applied vertically with joints staggered; base layer screw-attached with $\frac{7}{8}$ " USG Brand Hi-Lo Screws Type S; face layer laminated and attached with $1\frac{5}{8}$ " Type S screws; runners and perimeter caulked; joints finished.

Construction (B): Same as (A) but with $\frac{1}{2}$ " SHEETROCK SW FIRECODE "C" face layers applied to No. 158 ($1\frac{5}{8}$ ") Metal Studs in runners.

ADVANTAGES

1-hour Fire Rating with Construction (B); 1-hour (est.) for (A) based on performance of (B).

STC 52 with Construction (A), job test STC 50; STC 48 with (B).

MATERIALS

1. **USG Metal Stud**—No. 158 ($1\frac{5}{8}$ "), 358 ($3\frac{5}{8}$ ").
2. **USG Runners**—No. 158 ($1\frac{5}{8}$ "), 358 ($3\frac{5}{8}$ ").
3. **Faceboards**—48" wide, $\frac{1}{2}$ " or $\frac{5}{8}$ " thick Tapered Edge SHEETROCK SW FIRECODE or FIRECODE "C" Wallboard—lengths as required.

4. **Backing Board**— $\frac{1}{2}$ " USG Mineral Fiber Sound Deadening Board.
5. **Fasteners**—USG Brand HI-LO Screws, $\frac{7}{8}$ ", 1" and $1\frac{5}{8}$ " Type S, $\frac{3}{8}$ " Type S pan head.
6. **Adhesive**—PERF-A-TAPE Joint Compound-Taping (for fire-rated construction) or DURABOND 500 Mastic Contact Adhesive.
7. **Metal Trim**—(choose type from Chapter 2).
8. **Corner Bead**—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement.
9. **Joint Treatment**—Select a U.S.G. Joint System.
10. **USG Control Joint No. 093.**
11. **Acoustical Caulking.**



INSTALLATION

Stud System Erection—Align No. 158, 212, 358, 400 or 600 USG Metal Runners accurately at the floor and ceiling according to the partition layout. Follow instructions for positioning, attaching, and caulking runners shown in Chapter 3.

Install rough framing around door and borrowed light frames as described in Chapter 3.

Insert floor-to-ceiling height No. 158, 212, 358, 400 or 600 USG Metal Studs between runners, twisting them into position. Space studs 24" o.c.

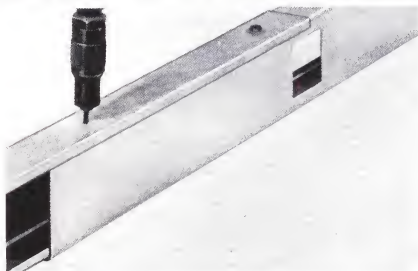
At partition corners, install a stud so that it forms the outside corner. Follow application of base layer wallboard to this stud,

install second stud in the abutting run and screw-attach web through base layer to flange of first stud.

Place studs in direct contact with all abutting partitions, partition corners and other construction. Where there is a possibility of water penetration through the walls, install an asphalt protection strip between the stud and the wall.

Anchor all studs adjacent to door and borrowed light frames, partition intersections and corners to the floor and ceiling runners. Use the USG Metal Lock Fastener or positive screw attachment with $\frac{3}{8}$ " Type S pan head, drywall screw through each stud flange and runner flange.

USG Metal Studs may be conveniently spliced together when required. To splice two studs, nest one into the other to a depth of at least 8". One flange of each stud must be in between two flanges of mating stud so studs interlock. Fasten together with two $\frac{3}{8}$ " Type S pan head screws in each flange. Locate each screw no more than 1" from ends of splice.



Wallboard Erection—Apply gypsum wallboard with the long dimension parallel (or at right angles) to studs. Position board so all abutting ends and edges (except edges with horizontal application) will be located in center of stud flanges. Be certain joints are neatly fitted and staggered on opposite sides of the



partition so they occur on different studs. Cut wallboard to fit neatly around all outlets and switch boxes.

For vertical single-layer wallboard application, fasten wallboard with 1" USG Brand HI-Lo Screws Type S spaced a maximum of 12" o.c. in field of board and 8" o.c. along vertical abutting edges. Stagger screws on abutting edges or ends.

For horizontal single-layer wallboard application and where fire rating is not required, fasten wallboard with 1" USG Brand HI-Lo Screws Type S spaced a maximum of 12" o.c. in the field of the board and 12" o.c. along the abutting end joints.

For two-layer job laminated construction, apply the base layer vertically with $\frac{7}{8}$ " or 1" USG Brand HI-Lo Screws Type S spaced 12" o.c. in field of board and 8" o.c., staggered at vertical joints of the board. Apply the face layer vertically with vertical joints, laminate and hold in place with $1\frac{1}{2}$ " Type G drywall screws or with temporary fastening until adhesive is dry.

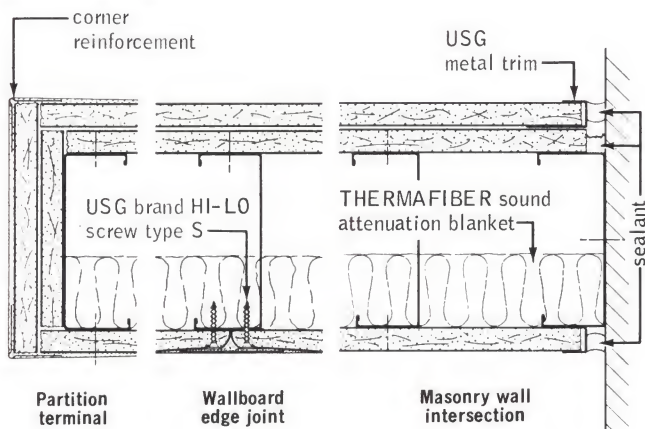
For two-layer construction with screw attachment of the face layer, apply the base layer vertically with vertical joints staggered on opposite sides of the partition and screw-attach with 1" USG Brand HI-Lo Screws Type S spaced 16" o.c. in the field and vertical joints of the board. Apply the face layer vertically with vertical joints offset 24" from base layer joints and staggered on opposite sides of the partition. Attach with $1\frac{5}{16}$ " or $1\frac{5}{8}$ " USG Brand HI-Lo Screws Type S spaced 16" o.c. in the field and vertical joints of the board. Refer to fire test report for specific details of construction.

Sound Deadening Board—Install $\frac{1}{2}$ " USG Mineral Fiber Sound Deadening Board as directed in Chapter 3.

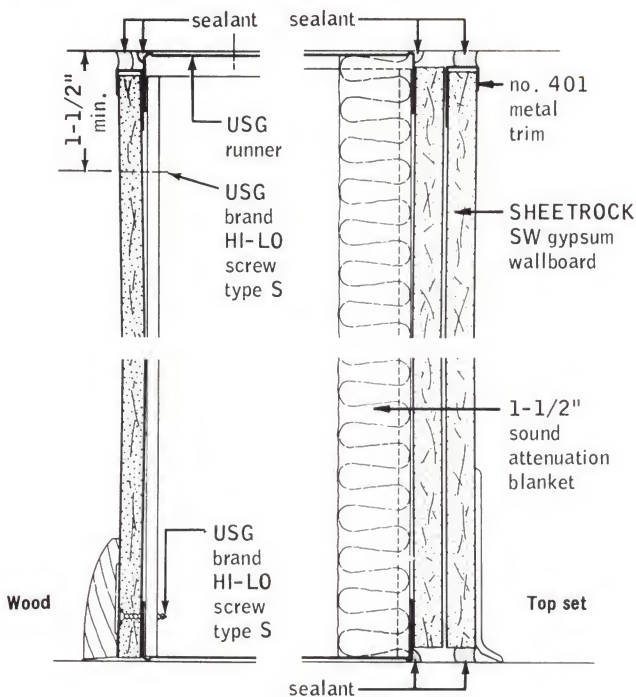
Insulating Wool—Install 1" and $1\frac{1}{2}$ " THERMAFIBER Sound Attenuation Blankets as directed in Chapter 3.

Finishing Partition—Apply metal trim and corner bead, caulk perimeter, treat joints, fastener heads and trim (see Chapter 3).

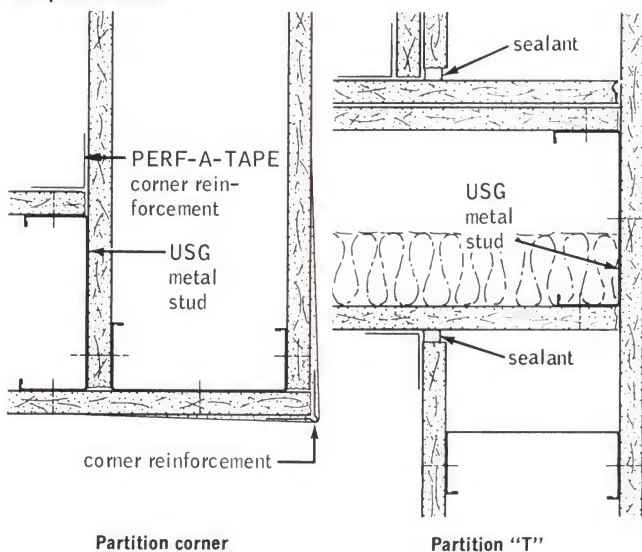
Wall plan sections

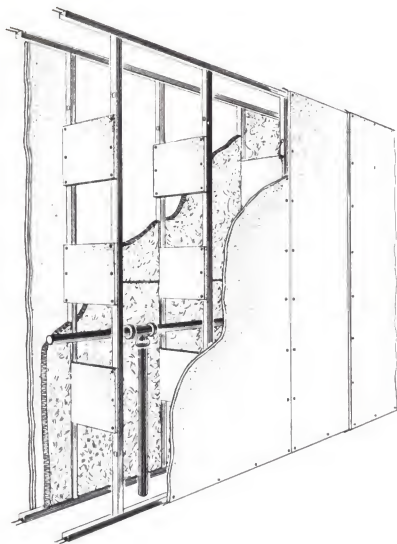


Floor and ceiling attachments



Wall plan sections





chase wall partitions

Metal Stud-Chase Wall partitions are used where greater core widths are needed for pipe chase enclosures and other service installations. Net pipe chase widths up to 24" are available by using the same materials and techniques required for the basic USG Metal Stud system. This non-load bearing construction consists of a double row of 1 $\frac{5}{8}$ " Metal Studs in runners. Cross braces of $\frac{1}{2}$ " or $\frac{5}{8}$ " gypsum board by chase width are installed at quarter points of the studs.

Double layer $\frac{1}{2}$ " SHEETROCK SW FIRECODE "C" Wallboard is screw-applied both sides of studs and 1 $\frac{1}{2}$ " THERMAFIBER Sound Attenuation Blankets are stapled to the back side of one base layer. Joints are treated with a USG joint system but may be left untreated if SHEETROCK W/R Wallboard is used as a base for the adhesive application of ceramic, metal or plastic wall tile. Limiting height: 10'.

ADVANTAGES

Sound Control—55 STC.

Fire Resistance—2 hours (estimated).

Versatility—Provides variable chase widths. Adaptable for use as party or corridor walls in all metal stud partitions.

MATERIALS

1. **USG Metal Studs**—No. 158 (1 $\frac{5}{8}$ ").
2. **USG Metal Runners**—No. 158 (1 $\frac{5}{8}$ ").
3. **Gypsum Board**— $\frac{1}{2}$ " or $\frac{5}{8}$ " thick, 4' wide Tapered Edge

SHEETROCK SW, SHEETROCK SW FIRECODE "C" Gypsum Wallboard or SHEETROCK W/R Wallboard—lengths as required.

4. Fasteners—USG Brand Hi-Lo Screws— $\frac{7}{8}$ ", 1", $1\frac{5}{16}$ " or $1\frac{5}{8}$ " Type S, $\frac{3}{8}$ " Type S pan head.

5. Metal Trim—(choose type from Chapter 2).

6. Corner Bead—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement.

7. Joint Treatment—Select a U.S.G. Joint System.

8. Insulation—THERMAFIBER Sound Attenuation Blankets $1\frac{1}{2}$ "x24"x48".

9. USG Control Joint No. 093.

10. Acoustical Caulking.

INSTALLATION

Set metal runners—Align double rows of No. 158 USG Metal Runners accurately at the floor and ceiling according to the partition layout. Spacing between outside flanges of each pair of runners must not exceed $25\frac{1}{4}$ ". Follow instructions for positioning, attaching and caulking runners shown in Chapter 3.

Position studs in runners—Insert No. 158 USG Metal Studs into floor and ceiling runners and twist into position. Start stud spacing (maximum 24" o.c.) from same point in each row of studs so that any pair of studs will be directly opposite each other with their flanges pointing in the same direction. Anchor all studs to floor and ceiling runners with USG Metal Lock Fastener or $\frac{3}{8}$ " USG Brand Screws Type S pan head.

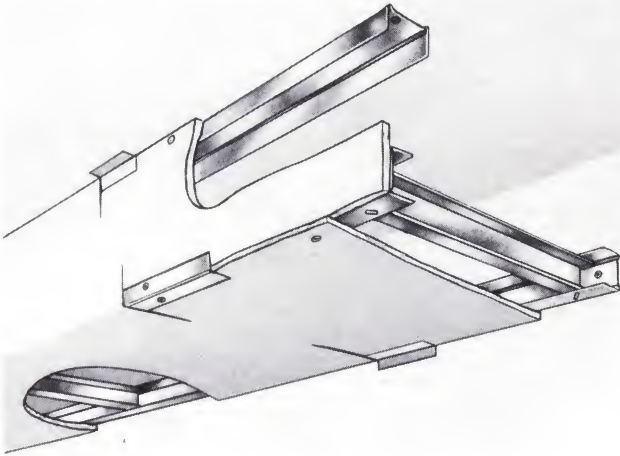
Attach cross bracing—Cut cross-brace sections from $\frac{1}{2}$ " or $\frac{5}{8}$ " SHEETROCK Wallboard a minimum 12" x distance between outer flanges of adjacent runners. Each pair of studs will require a minimum of 3 cross-braces located at quarter points with one brace at partition center height. Fasten first cross-brace at partition center height with a minimum of three USG Brand Hi-Lo Screws Type S, along each stud web. Use $\frac{7}{8}$ " long screws for $\frac{1}{2}$ " thick board; 1" long for $\frac{5}{8}$ " thickness. Fasten other two cross-braces in same manner. Deviate from this procedure only where layout of pipes, ducts, etc., requires it.

Apply Wallboard—Apply $\frac{1}{2}$ " or $\frac{5}{8}$ " SHEETROCK Wallboard vertically with long dimension parallel to framing members. Fasten wallboard to studs with USG Brand Hi-Lo Screws Type S, spaced 12" o.c. in field of board and 8" o.c., staggered, along vertical abutting edges.

For two-layer sound-rated construction with screw attachment of the face layer, apply the base layer vertically with vertical

joints staggered on opposite sides of the partition and screw-attach with $\frac{7}{8}$ " USG Brand Hi-Lo Screws Type S spaced 16" o.c. in the field and vertical joints of the board. Apply the face layer vertically with vertical joints offset 24" from base layer joints and staggered on opposite sides of the partition. Attach with $1\frac{5}{16}$ " USG Brand Hi-Lo Screws Type S spaced 16" o.c. in the field and vertical joints of the board.

Finishing partition—Apply metal trim and corner bead; caulk around all openings and partition perimeter; treat all joints, fastener heads and trim as directed in Chapter 3.



drywall soffit

The U.S.G. Drywall Soffit assembly consists of galvanized steel channel runners and studs faced with SHEETROCK SW Gypsum Wallboard, screw attached. It is a lightweight, fast and economical method of filling over cabinets or lockers and of housing overhead ducts, pipes or conduits. The system permits constructing soffits with depth of 48" and widths to 72" without supplementary vertical studs.

Design Recommendations—Maximum Dimensions (1):

Gypsum Board Thickness (2)	Metal Stud Size	Maximum Width	Max. Depth for Max. Width Shown
$\frac{1}{2}$ "	$1\frac{5}{8}$ "	60"	48"
$\frac{1}{2}$ "	$2\frac{1}{2}$ ", $3\frac{5}{8}$ "	72"	36"
$\frac{5}{8}$ "	$1\frac{5}{8}$ "	60"	30"
$\frac{5}{8}$ "	$2\frac{1}{2}$ ", $3\frac{5}{8}$ "	72"	18"

- (1) The construction is not designed to support loads other than its own dead weight and should not be used where it may be subjected to excessive abuse.
- (2) The double-layer wallboard system and $\frac{3}{8}$ " thick wallboard are not recommended for this construction.

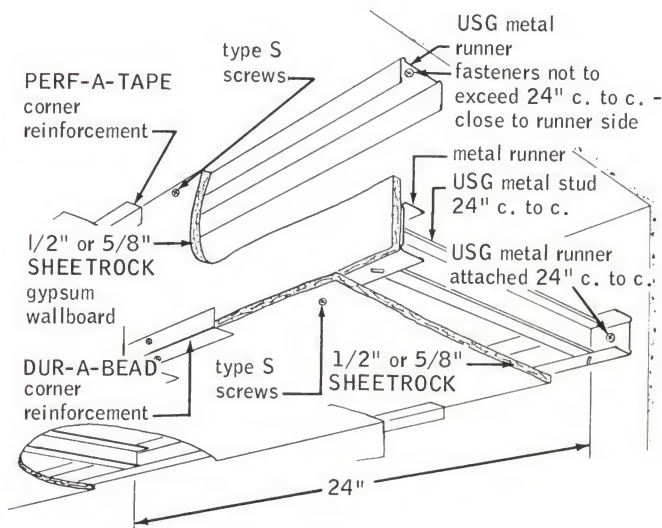
MATERIALS

1. **USG Metal Studs**—No. 158, 212, 358.
2. **USG Runners**—No. 158, 212, 358.
3. **Gypsum Board**— $\frac{1}{2}$ " or $\frac{5}{8}$ " thick, 4' wide Tapered Edge SHEETROCK SW Gypsum Wallboard—lengths as required.
4. **Fasteners**— $\frac{7}{8}$ " or 1" USG Brand Hi-Lo Screws Type S.
5. **Corner Bead**—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement.
6. **Joint Treatment**—Select a U.S.G. joint system.
7. **USG Control Joint No. 093.**

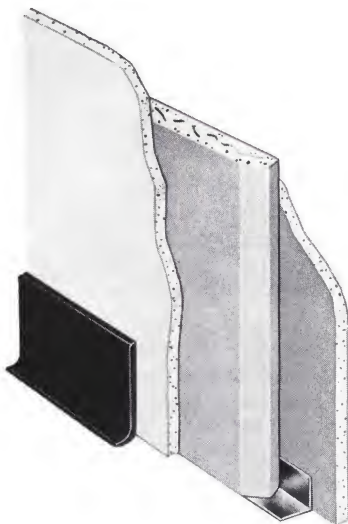
INSTALLATION

Align runners for drywall soffits accurately at the ceiling and side wall according to the layout. Attach runners to ceiling construction as shown in Chapter 3; place fastener close to outside face of runner. On stud walls, space fasteners to engage stud.

Fasten vertical wallboard face panel to web of face corner runner and flange of ceiling runner with $\frac{7}{8}$ " or 1" USG Brand Hi-Lo Screws Type S spaced 12" o.c. Use $\frac{7}{8}$ " long screws for $\frac{1}{2}$ " thick board; 1" long for $\frac{5}{8}$ " thickness. Place screws in face corner runner at least 1" from edge of SHEETROCK panel. Insert metal studs between face corner runner and sidewall runner and attach alternate studs to runners with the USG Metal Lock Fastener. Attach bottom face panel to metal studs and runners with Type S screws spaced 12" o.c. Finish soffit with corner bead and joint treatment.



laminated gypsum partitions



solid partition

Solid Partitions are by far the most economical, both in erected cost and floor space occupied, of the 2-hour fire-rated gypsum drywall assemblies. These non-load bearing constructions are ideal for interior partitions, vent shaft or elevator shaft enclosures. In these partitions SHEETROCK Wallboard face layers are job-laminated to 1" USG Gypsum Coreboard secured by floor and ceiling runners. Coreboard is cut or routed for electrical services.

FIRE RATED CONSTRUCTION

Construction (A): 1/2" SHEETROCK SW FIRECODE "C" Wallboard face layers applied vertically with staggered joints and laminated to 1" USG Coreboard in metal floor and ceiling runners; joints treated. **Construction (B):** Same as (A) except untreated wood floor and ceiling runners, 1/2" regular SHEETROCK SW Wallboard face layers. **Construction (C):** *Vent shaft construction:* 5/8" SHEETROCK SW FIRECODE face layers vertically applied each side over 1" USG Coreboard; face layers laminated and screw attached; 1 3/8"x7/8"x24 ga. metal angle runners placed horizontally at floor and quarter panel heights; No. 158 USG Metal Runner at ceiling; joints staggered and unfinished.

ADVANTAGES

Fire Resistance—2 hours with Construction (A), 1 1/2 hours with (B). Construction (C) is 2-hour drywall vent shaft design.

Versatility—Space-saving divider between units; highly effective

as vent shaft enclosure; suitable for use in all type of new construction and remodeling.

Economical—Low-cost materials and a minimum number of parts erect fast for superior economy.

Maximum Recommended Partition Heights (1)

Width Between Restraints	2" Solid Partition	2¼" Solid Partition (2)
Up to 12'	12'	14'
12' to 18'	11'	13'
Over 18'	10'	12'

(1) For partitions with complete perimeter restraint and no openings. Where openings occur in short runs, use maximum height "over 18 ft." width between restraints.

(2) When ⅝" thick SHEETROCK wallboard used as face layers.

MATERIALS

1. Faceboards—½" or ⅝" thick, 48" wide, Tapered Edge SHEETROCK SW Wallboard (regular) (FIRECODE) (FIRECODE "C")—lengths as required.

2. Coreboard—1" thick, 24" wide, USG "V" T&G Edge Gypsum Coreboard—lengths as required.

3. Metal Runners

—USG Metal Angle Runner 1⅜"x⅞"x24 ga. (for **Constructions A and C**).

—USG Metal Runner, No. 158 (for **Construction C**).

4. Wood Runner—1"x1" minimum stock, straight, true and free from knots.

5. USG Brand Screws—⅞", 1", 1¼", 1⅝", 2¼", Hi-Lo Type S; 1½" Type G; 1¼" Type W.

6. Adhesive—PERF-A-TAPE Joint Compound-Taping (for fire-rated construction) or DURABOND 500 Mastic Contact Adhesive.

7. Corner Bead—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement.

8. Metal Trim—(choose type from Chapter 2).

9. Joint Treatment—Select a U.S.G. Joint System.

10. USG Control Joint No. 093.

INSTALLATION

Partition Construction

Align Metal Angle Runners accurately at the floor and ceiling according to the partition layout. Follow instruction for positioning, attaching, and caulking behind runners shown in Chapter 3.

Cut coreboard to fit between floor and ceiling runners. Before installation, cut necessary openings in coreboard to accept electrical services (i.e. rigid conduct, flexible cable, electrical boxes, etc.). Install coreboard vertically, exposing rounded tongue edge. Fasten coreboard to angle runners with

**Fig. A****Fig. B**

two 1¼" Type S screws placed 3" in from each edge (Fig. A). Erect succeeding panels using the same procedure.

Place a cut-to-size section of coreboard over metal door frame header, engage bottom edge in anchor clips in door frame and secure top edge in runner with 1¼" Type S screws. Measure and cut next coreboard to fit snugly to metal door frame (Fig. B). Insert panels firmly into anchor clips (see inset). After coreboard is installed, spot grout frame at each clip using DURABOND or USG Ready-Mixed Joint Compound.

Nail coreboard panels together where partitions intersect. Mark centerline of intersecting joint on face of coreboard which conceals joint. Drive 10d common nails 24" o.c. into coreboard along center line, ½" from corner edge. Treat corners in same manner.

**Fig. C****Fig. D**

Cut ½" face layer panels to fit completely inside floor and ceiling runners. Apply PERF-A-TAPE Joint Compound-Taping or DURABOND 500 Mastic Contact Adhesive to coreboard or back of face layer panels. Apply face layer vertically to coreboard, with vertical abutting joints at least 3" away from coreboard joints (Fig. C). Press face layer against coreboard to insure an adequate

bond. Secure with 1½" Type G drywall screws (Fig. D) as described in Chapter 3.

To finish partition apply metal trim and corner bead, caulk around all openings and partition intersections, treat all joints, fastener heads and trim as directed in Chapter 3.

Vent Shaft Construction

Align floor, ceiling and sidewall angle runners accurately according to the partition layout. Fasten runners securely to structural supports with suitable fasteners 24" o.c. Install No. 158 ceiling runners by fastening through the web. Install 1⅜"x⅞"x24 ga. galvanized metal angle runners on the floor and sidewalls by fastening through the short leg. As an alternate, metal angles may be used as ceiling runners. Install side angle runners 30" long centered for attachment of horizontal bracing angles.

Install 1⅜"x⅞"x24 ga. galvanized bracing angles horizontally at quarter points down from the ceiling, up from the floor and spaced no greater than 5' o.c. Position long leg for wallboard attachment and fasten to sidewall angles with 1" Type S screws.

Apply ⅝" SHEETROCK SW FIRECODE Wallboard vertically and fasten to angles and runners with 1" Type S screws 16" o.c. Install 1" coreboard with vertical joints staggered 12" from wallboard joints using the sheet lamination method (see Chapter 3).

Install second floor and side angle runners (and ceiling angles, if required) with the long leg against the coreboard. Attach coreboard to ceiling runners and angles with 2¼" Type S screws spaced 12" o.c. Drive screws at least 6" away from coreboard edges.

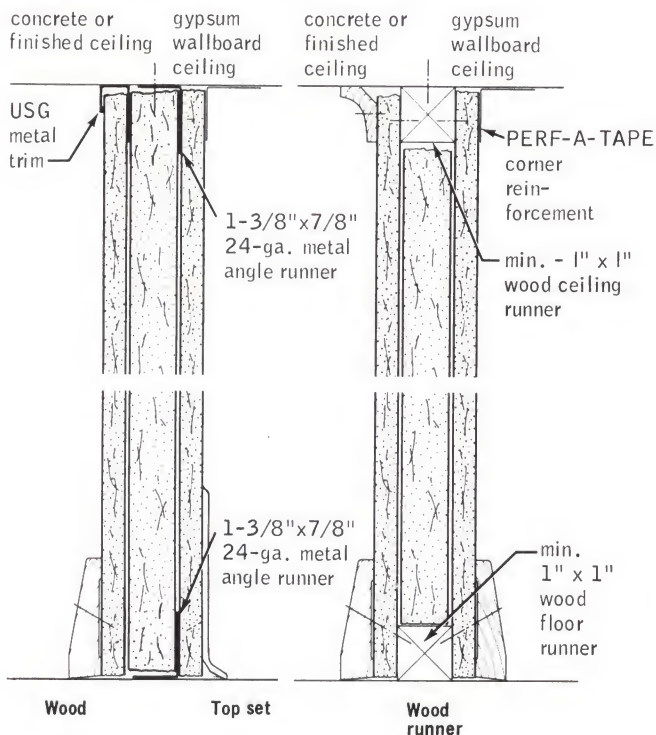
Install ⅝" SHEETROCK SW FIRECODE face layer vertically with vertical joints staggered 12" from joints in coreboard. Use sheet lamination and Type G screws. Screw-attach face layer to angles around perimeter with 1" Type S screws 12" o.c. Fill nail holes with joint compound and finish joints if desired.

USG Shaft Wall Systems

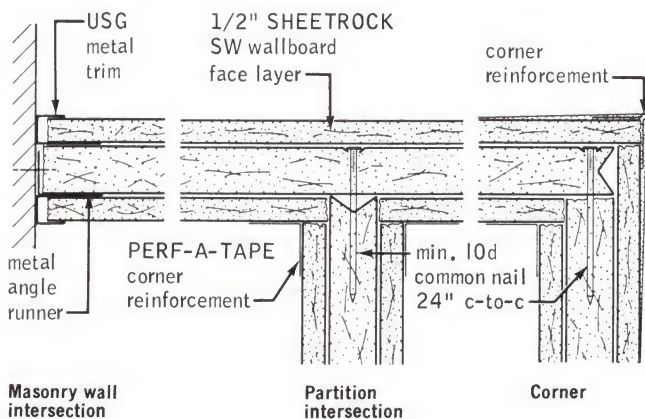
These gypsum drywall assemblies are ideal for enclosing elevator shafts, stair wells, and other vertical shafts in multi-story buildings. Consisting of SHEETROCK SW Gypsum Wallboard and USG Laminated Coreboard set in runners and steel H-Studs, these lightweight non-load bearing assemblies are easily installed from outside the shaft. They can be used as temporary shaft enclosures and finished later along with interior partitions. When properly caulked, they will provide resistance to air pressure within the shaft. The width of coreboard panels and stud spacing will be 12", 16" or 24" o.c. depending on ceiling heights and pressure loads. These assemblies are thinner than masonry constructions, yet offer fire-resistance ratings up to 3 hours. Refer to U.S.G. Shaft Wall Manual WB-1279 for installation procedures.

Solid partition details

Floor and ceiling attachments

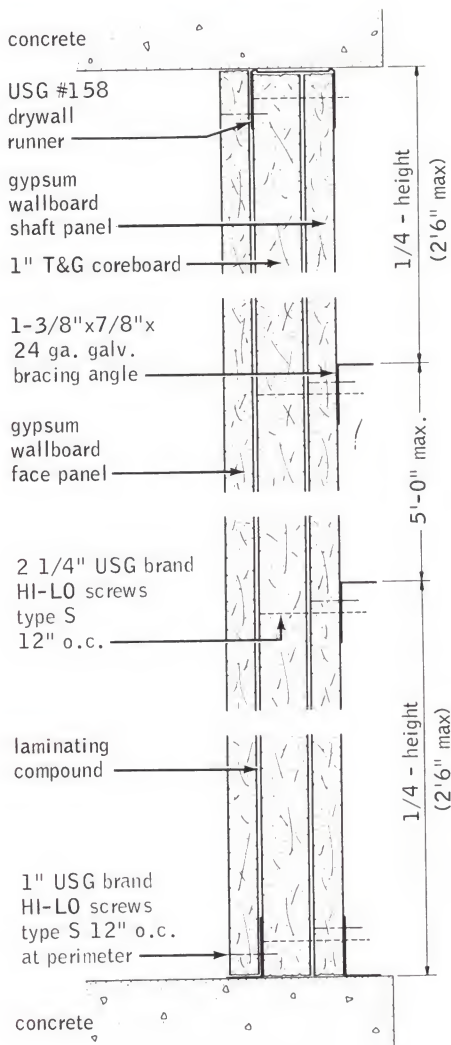


Wall plan sections



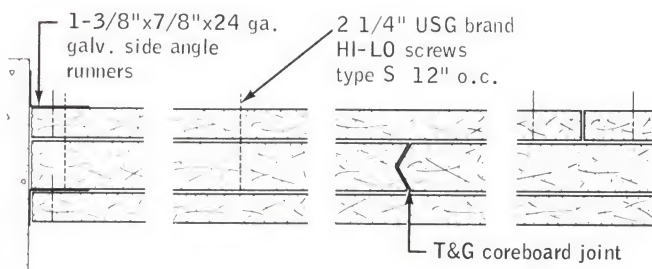
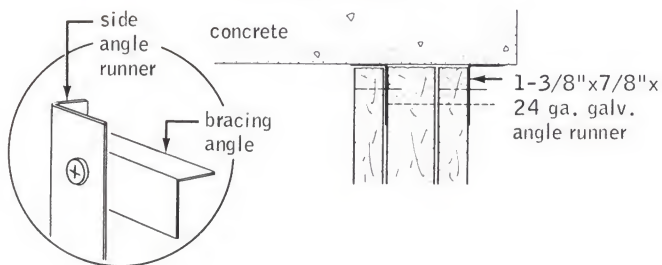
Vent shaft details

Ceiling attachment

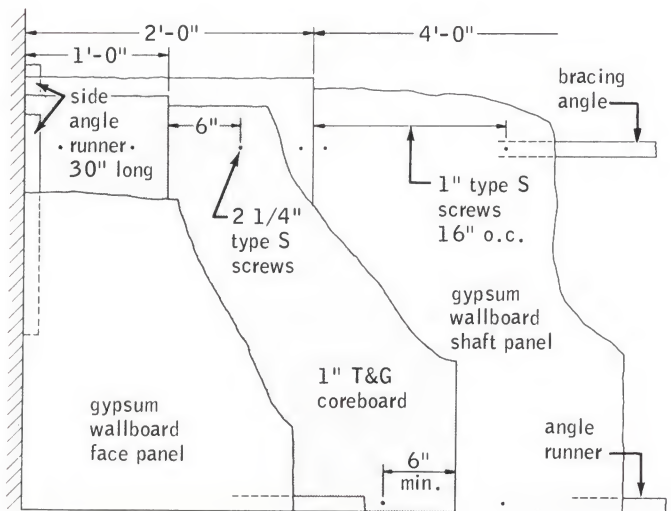


Floor attachment

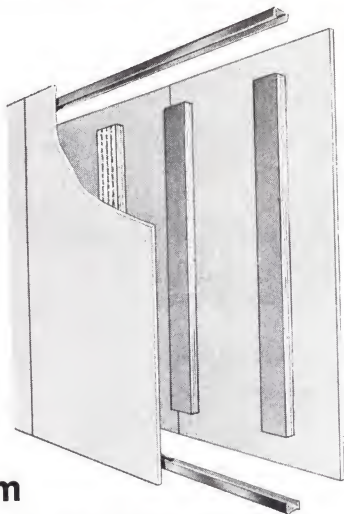
Alt. ceiling attachment



Horizontal cross section



Wall elevation



gypsum studwall partitions

Gypsum Studwall Partitions are among the lowest-cost incombustible interior dividers available. These lightweight space-saving, non-load bearing assemblies have a built-in chase for electrical services. The systems inherently provide back-blocking; minimize joint ridging. Limiting height: 12'.

FIRE RATED CONSTRUCTION

Construction, 278 Studwall: $\frac{5}{8}$ " SHEETROCK SW FIRECODE face layers job-laminated to both sides of gypsum studs; $1\frac{5}{8}$ "x6" mill-fabricated gypsum studs 24" o.c., wallboard screw attached both sides of metal floor and ceiling runners; joints finished. **258 Studwall:** same except $\frac{1}{2}$ " thick face layers.

ADVANTAGES

Fire Resistance—1 hour with 278 Studwall.

Light Weight—6 to 7 psf. Ideal for interior dividers where reduced loads are required.

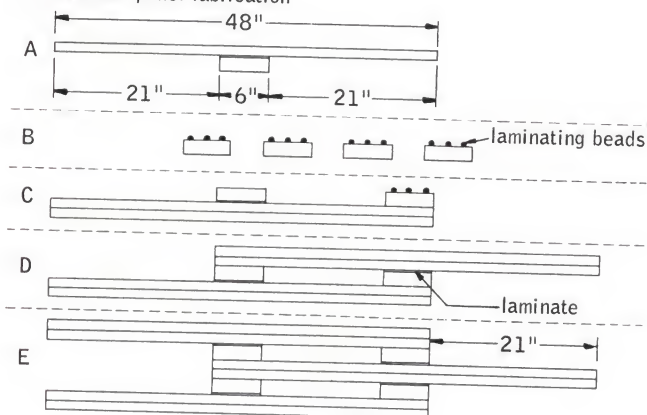
Space-Saving—Thickness: $2\frac{5}{8}$ " for 258 and $2\frac{7}{8}$ " for 278 Studwall.

MATERIALS

- 1. USG Metal Studs**—No. 158 ($1\frac{5}{8}$ ").
- 2. USG Runners**—No. 158 ($1\frac{5}{8}$ ").
- 3. Faceboards**—48" Wide, $\frac{1}{2}$ " or $\frac{5}{8}$ " thick Tapered Edge (SHEETROCK SW) (SHEETROCK SW FIRECODE) Wallboard—lengths as required.
- 4. Gypsum Studs**— $1\frac{5}{8}$ "x6" USG Gypsum Studs, factory laminated ($\frac{1}{2}$ "- $\frac{5}{8}$ "- $\frac{1}{2}$ " in stock lengths).
- 5. Adhesive**—PERF-A-TAPE Joint Compound-Taping (for fire-rated construction) or DURABOND 500 Mastic Contact Adhesive.

6. **Fasteners**—USG Brand Screws, 1" Hi-Lo Type S, $\frac{3}{8}$ " Type S pan head, $1\frac{1}{2}$ " Type G.
7. **Metal Trim**—(choose type from Chapter 2).
8. **Corner Bead**—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement.
9. **Joint Treatment**—Select a U.S.G. Joint System.
10. **USG Control Joint No. 093.**

STUDWALL panel fabrication



INSTALLATION

Panel Fabrication—Laminate one $1\frac{5}{8}$ "x6" Gypsum Stud in the center of back of face panel using PERF-A-TAPE Joint Compound-Taping or DURABOND 500 Mastic Contact Adhesive (see Fig. A). Spread adhesive in heavy ribbons, $\frac{1}{2}$ " wide at the base and $\frac{5}{8}$ " high. Space ribbons 2" o.c. and 1" away from each edge of gypsum studs. Use the following laminating procedure:

1. Place adhesive on four gypsum studs, $1\frac{5}{8}$ "x6", cut 12" less than the length of the SHEETROCK face boards (see Fig. B).
2. Place an unopened bundle of SHEETROCK face boards on a smooth level surface. Boards should be cut to full floor-to-ceiling height for vertical application.
3. Place one adhesive coated gypsum stud, adhesive side down, in the center of the face board 21" from each side and 6" from top and bottom edges.
4. Place a second gypsum stud, adhesive side up, along the edge of the face board (Fig. C).
5. Stack a second unopened bundle of SHEETROCK face boards on top of gypsum studs so that edge of top bundle is aligned with edge of underlying center gypsum stud (Fig. D).
6. Repeat the laminating procedure and build the stack until the desired number of full panels are laminated (Fig. E).
7. Allow adhesive to set and dry before moving panels.

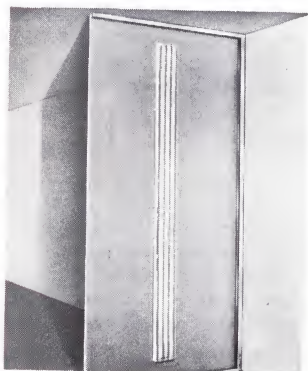
Stud and Runner Erection—Align No. 158 Runners accurately at the floor and ceiling according to the partition layout. Attach floor runner securely 16" o.c. Follow instructions for positioning, attaching, and caulking runners shown in Chapter 3.

Install rough framing around door and borrowed light frames as described in Chapter 3.

Install floor to ceiling height No. 158 USG Metal Studs vertically at "T" intersections, corners, partition terminals, and intersections with structural members or walls. Securely fasten all studs to floor and ceiling runners with the USG Metal Lock Fastener.

Panel Erection—Beginning at an intersection, attach a No. 158 stud to an existing structural element on the centerline of the proposed partition with suitable fasteners spaced no more than 24" o.c.

Cut a 2' wide starter panel from a 4' width of face board (without gypsum stud attached) and install on one side of partition. Anchor panel to floor and ceiling runners and to No. 158 stud with 1" Type S screws spaced 12" o.c.



Typical panel, erected



Starter & first full panel

Apply laminating adhesive to gypsum stud already attached to full size faceboard. Erect this panel on side opposite the starter panel so the starter panel edge bisects the gypsum stud. Fasten the panel to floor and ceiling runners and the No. 158 stud with 1" Type S screws spaced 12" o.c.

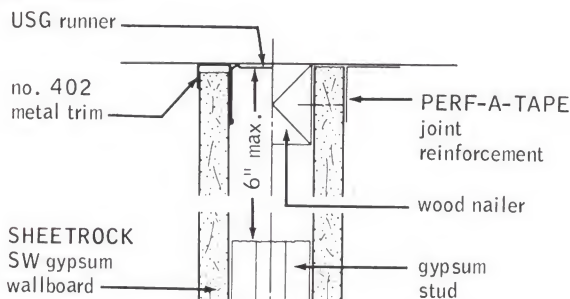
Continue erecting face panels with gypsum studs attached alternately to opposite sides of the partition. Fasten faceboards to runners and all metal studs with 1" Type S screws spaced 12" o.c. Screw faceboards to gypsum studs at vertical joints with 1½" Type G screws spaced 12" from runners and no more than 36" o.c. Keep vertical panel joints at least 6" away from structural members, partition terminals, intersections, corners,

doors and other openings. Gypsum studs in completed assembly should be spaced no more than 24" o.c.

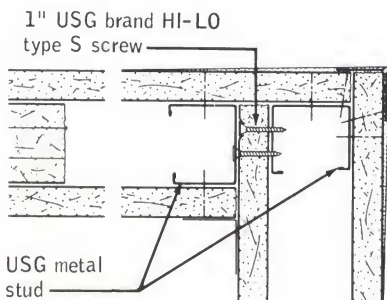
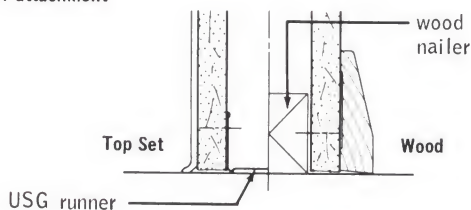
At partition corners complete the panel erection for one partition run. Then begin erection of intersecting partition as described above, attaching No. 158 stud to previously erected partition with 1" Type S screws spaced 24" o.c. Drive screws through face boards to engage corner metal stud in first partition run (see partition corner detail, below).

Finishing Partition—Apply metal trim and corner bead, caulk perimeter if necessary for sound control, treat all joints, fastener heads and trim as directed in Chapter 3.

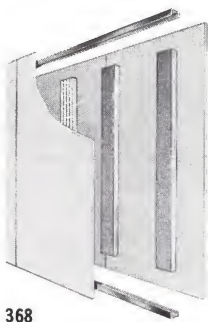
Ceiling attachment



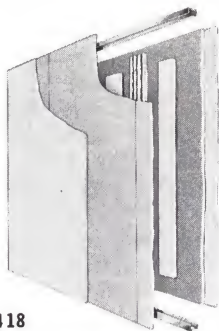
Floor attachment



Partition corner



368



418

gypsum ribwall partitions

Gypsum Ribwall Partitions incorporate 1 $\frac{5}{8}$ " to 2 $\frac{1}{2}$ " of interior air space between opposite facings for improved fire and sound resistance. They accommodate electrical services and plumbing, and serve efficiently as narrow width party walls and vent shafts. These non-load bearing constructions inherently provide back-blocking; minimize ridging. Limiting height: 8' for 368 Ribwall; 12' for 418 Ribwall with restraints less than 20', and 10' with restraints over 20'.

FIRE AND SOUND RATED CONSTRUCTION

Construction, 368 Ribwall: $\frac{5}{8}$ " SHEETROCK SW face layers job-laminated to one side of gypsum ribs; 1 $\frac{5}{8}$ "x6" mill-fabricated gypsum ribs staggered 12" o.c.; wallboard screw attached to both sides of 2 $\frac{1}{2}$ " metal floor and ceiling runners; joints finished. **418 Ribwall:** double-layer $\frac{5}{8}$ " SHEETROCK SW FIRECODE Wallboard job laminated to one side of gypsum ribs; 1"x6" gypsum ribs staggered 12" o.c. are snapped and separated on the job from USG Coreboard; wallboard screw attached to both sides of 1 $\frac{5}{8}$ " metal floor and ceiling runners; joints finished.

ADVANTAGES

Fire Resistance—2 hours with 418 Ribwall, 1 hour (est.) with 368 Ribwall.

Sound Control—51 STC with 418 Ribwall; 43 STC with 368 Ribwall.

Light Weight—Space savings and reduced loads are superior for sound ratings obtained. 368 Ribwall—thickness 3 $\frac{3}{4}$ ", weight 8 psf. 418 Ribwall—thickness 4 $\frac{1}{8}$ ", weight 12 psf.

MATERIALS

368 Ribwall

1. **Faceboards**— $\frac{5}{8}$ " thick, 4' wide Tapered Edge SHEETROCK SW Wallboard—lengths as required.
2. **Gypsum Ribs**—1 $\frac{5}{8}$ "x6" USG Gypsum Ribs, factory laminated ($\frac{1}{2}$ "- $\frac{5}{8}$ "- $\frac{1}{2}$ ") in stock lengths.
3. **USG Metal Studs**—No. 212 (2 $\frac{1}{2}$ ").
4. **USG Runners**—No. 212 (2 $\frac{1}{2}$ ").

5. Fasteners—USG Brand Screws, 1" HI-Lo Type S, $\frac{3}{8}$ " Type S pan head, $1\frac{1}{2}$ " Type G.

418 Ribwall

1. Faceboards— $\frac{5}{8}$ " thick, 4' wide Tapered Edge SHEETROCK SW FIRECODE—lengths as required.

2. Base Layer— $\frac{5}{8}$ " thick, 4' wide BAXBORD Backing Board, 8'.

3. Gypsum Ribs—1"x6" USG Gypsum Ribs, snapped and separated from 1"x24" USG Coreboard prescored 6" o.c.

4. USG Metal Studs—No. 158 ($1\frac{5}{8}$ ").

5. USG Runners—No. 158 ($1\frac{5}{8}$ ").

6. Fasteners—USG Brand Screws, 1" and $1\frac{5}{8}$ " HI-Lo Type S, $\frac{3}{8}$ " Type S pan head, $1\frac{1}{2}$ " Type G.

Both Partitions

1. Adhesive—PERF-A-TAPE Joint Compound-Taping (for fire-rated construction) or DURABOND 500 Mastic Contact Adhesive.

2. Metal Trim—(choose type from Chapter 2).

3. Corner Bead—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement.

4. Joint Treatment—Select a U.S.G. Joint System.

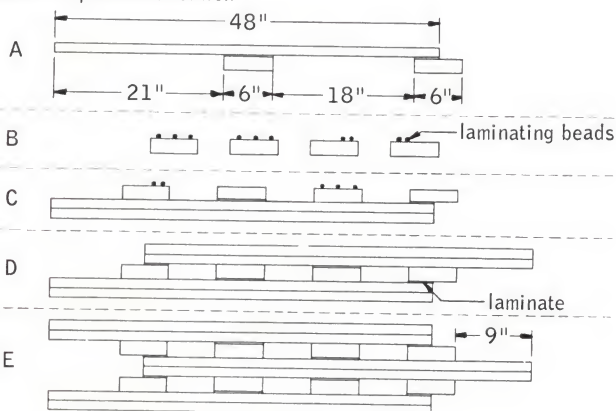
5. USG Control Joint No. 093.

6. Acoustical Caulking.

INSTALLATION—368 RIBWALL

Panel Fabrication—Laminate two $1\frac{5}{8}$ "x6" gypsum ribs to the back of face boards using PERF-A-TAPE Joint Compound-Taping (see A below). Spread adhesive in heavy ribbons, approximately $\frac{1}{2}$ " wide at the base and $\frac{5}{8}$ " high. Space ribbons 2" o.c. and 1" away from each edge of ribs. As an alternate, use DURABOND 500 Adhesive applied as in Chapter 2. Use the following procedure per diagrams below.

RIBWALL panel fabrication



1. Place four ribs, cut 12" less than length of face panel, side by side on a smooth, level surface and spread adhesive over two of the ribs and over half of the two remaining ribs (see B).
2. Place an unopened bundle of 5/8" SHEETROCK face boards on a smooth level surface. Boards should be cut to full floor-to-ceiling height for vertical application. Lay the four ribs in position (see C) with the rib ends 6" from the top and bottom of the face panels.
3. Place an unopened bundle of 5/8" SHEETROCK face boards on top of the four ribs in a staggered position (see D).
4. Repeat the laminating procedure and build the stack until the desired number of panels are laminated (see E).
5. Allow laminating compound to dry before moving panels.

Stud and Runner Erection—Align No. 212 runners accurately at the floor and ceiling according to the partition layout. Attach floor runners securely 16" o.c. Follow instructions for positioning, attaching, and caulking runners shown in Chapter 3.

Using No. 212 studs and No. 212 runners install rough framing around door and borrowed light frames as described in Chapter 3.

Install floor to ceiling height No. 212 studs vertically at "T" intersections, corners, partition terminals, and intersections with structural members or walls. Securely fasten all studs to floor and ceiling runners with the USG Metal Lock Fastener.

Panel Erection—Beginning at an intersection, attach a No. 212 Metal Stud to an existing structural element on the centerline of the partition with suitable fasteners spaced no more than 24" o.c. Caulk runner, as necessary. Then erect one entire side of the partition in the following manner:

Butt the un-ribbed, vertical edge of a 4' wide rib laminated panel firmly against existing wall. Screw attach panel to floor and ceiling runners and to stud with 1" Type S screws 12" o.c.

Apply laminating adhesive to exposed portion of gypsum rib on starter panel. Butt the next panel in position and screw attach to floor and ceiling runners with 1" Type S screws 12" o.c.

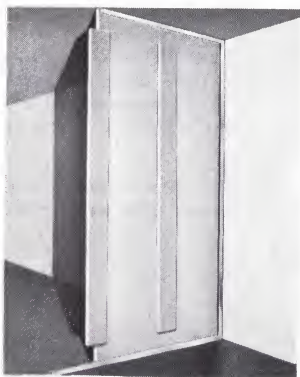
Before the adhesive sets, screw face panels to gypsum ribs at vertical joints with 1½" Type G screws spaced 12" from runners and no more than 36" o.c. Keep vertical panel joints at least 6" away from structural members, partition, terminals, intersections, corners, doors and other openings.

Fasten panels to all metal studs and runners with 1" Type S screws 12" o.c. Erect one entire side of partition as described above. Erect the second side of the partition in the same manner as the first side except begin with a 3' wide starter panel. The 3' starter panel is made by cutting 12" off a 4' panel on the edge opposite the rib.

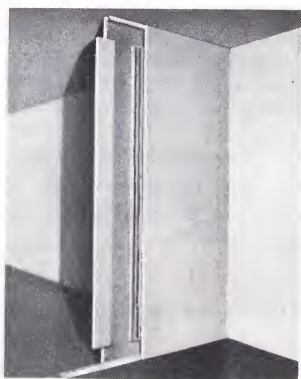
At door frames and other openings terminate the usual construction at one jamb and begin again at the other jamb. Position a cut-to-size wallboard panel over the door header and fasten ribwall and plain panels to all metal studs and runners with 1" Type S screws 12" o.c.

At partition corners complete the panel erection for one partition run. Then begin erection of intersecting partition as described above, attaching a metal stud to previously erected partition with 1" Type S screws 24" o.c. Drive screws through face boards to engage corner metal stud in first partition run (see partition corner detail).

Finishing Partition—Apply metal trim and corner bead, caulk perimeter, treat all joints, fastener heads and trim as directed in Chapter 3.



Typical panel, erected



Starter & first full panel

INSTALLATION—418 RIBWALL

Panel Fabrication—Snap 1"x6" gypsum ribs from prescored 24" wide, 1" thick USG Coreboard. Place board with a prescored line over the edge of a table or coreboard stack. Separate strips by forcing sharply downward. Laminate two 1"x6" gypsum ribs to the back of BAXBORD panels using PERF-A-TAPE Joint Compound-Taping or DURABOND 500 Adhesive. Spread PERF-A-TAPE Adhesive in heavy ribbons approximately 1/2" wide at the base and 5/8" high. Space ribbons 2" o.c. and 1" away from each edge of gypsum ribs. Apply DURABOND 500 as in Chapter 2. Use the same procedure described for 368 Ribwall.

Stud and Runner Erection—Align No. 158 Runners accurately at the floor and ceiling according to the partition layout. Attach floor runners securely 16" o.c. Follow instructions for positioning, attaching, and caulking runners as shown in Chapter 3.

Using No. 158 studs and No. 158 runners, install rough framing around door and borrowed light frames as described in Chapter 3.

Install floor to ceiling height No. 158 studs vertically at "T" intersections, corners, partition terminals, and intersections with structural members or walls. Securely fasten all studs to floor and ceiling runners with the USG Metal Lock Fastener.

Panel Erection Base Layer—Beginning at an intersection, attach a No. 158 Metal Stud to an existing structural element on the centerline of the partition with suitable fasteners spaced no more than 24" o.c. Caulk runner, as required for sound control. Then erect the base layer to one entire side of the partition in

the manner described for the 368 Ribwall. Fasten base layers to all metal studs and runners with 1" Type S screws 12" o.c. Screw base layers to gypsum ribs at vertical joints with 1½" Type G screws spaced 12" from runners and no more than 36" o.c. Keep vertical panel joints at least 6" away from all vertical metal studs.

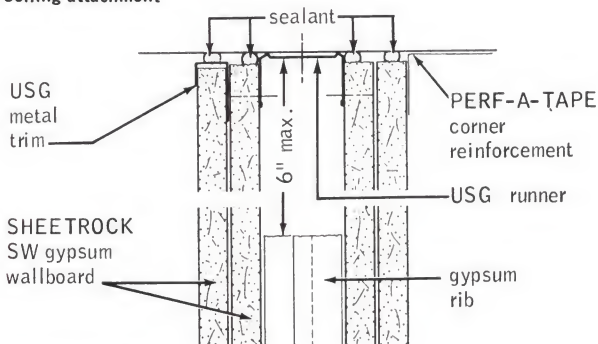
Erect base layer to the second side of the partition in the same manner as the first side using the 3' wide starter panel described above for 368 Ribwall. Construction at door frames and partition corners is the same as for 368 Ribwall.

Face Layer—Apply the face layer panels vertically and in a staggered pattern so that vertical joints occur half way between those of the base layer. Laminate the face layer using the sheet lamination method described in Chapter 3. Permanently attach face panels to base layer and gypsum ribs with 1½" Type G screws as specified in Chapter 3.

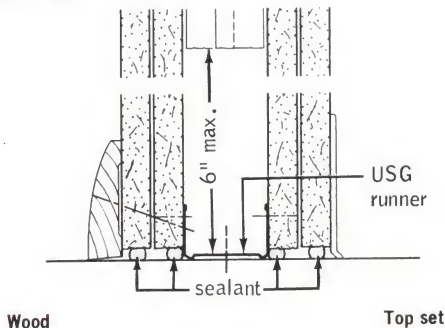
Finishing Partition—Apply metal trim and corner bead, caulk perimeter, treat all joints, fastener heads and trim as directed in Chapter 3.

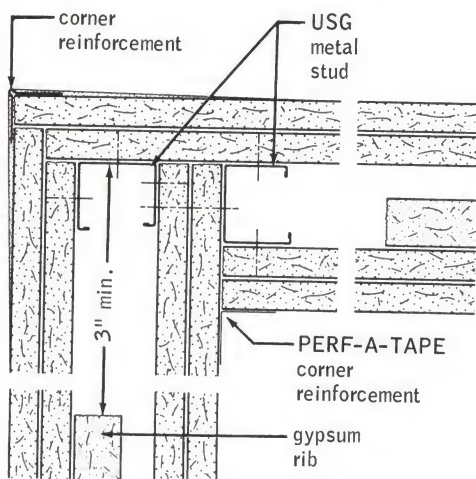
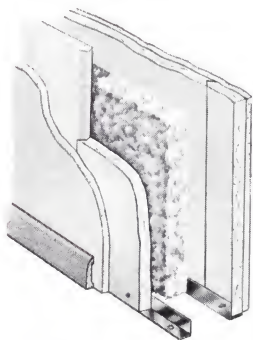
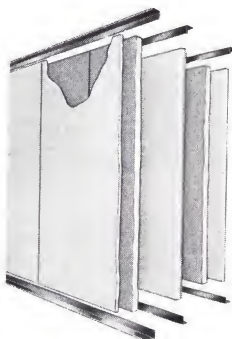
418 Ribwall partition details

Ceiling attachment



Floor attachment



418 Ribwall partition details**Partition corner****double and triple solid partitions****Double solid****Triple solid**

USG Double Solid and Triple Solid Partitions offer outstanding sound isolation at low cost plus 2-hour fire resistance—an ideal combination for party walls. In these non-load bearing partition assemblies SHEETROCK SW Gypsum Wallboard face layers are job-laminated to the outer sides of parallel rows of 1" USG Gypsum Coreboard, spaced a specified distance apart. These con-

struction features make greater partition core widths available for plumbing and other mechanical installations.

In the triple solid partition the center row serves as a "septum" or uncut barrier to prevent sound from leaking through openings cut in the partition faces for electrical or plumbing fixtures, medicine cabinets, etc. Electrical conduit and boxes may be installed in the space on either side of the septum. By increasing the space between the coreboard rows, greater core widths may be obtained for light mechanical equipment without destroying the outstanding sound control properties of this assembly.

FIRE AND SOUND RATED CONSTRUCTION

Double Solid—Construction (A): Double row 1" Coreboard spaced 3" apart in metal angle runners; one row backed with 1½" THERMAFIBER Sound Attenuation Wool; both rows faced with ½" Regular SHEETROCK SW Wallboard laminated and screw attached; joints finished. **Construction (B):** Same as (A) but with coreboard rows spaced 1½" apart and wool omitted.

Triple Solid—Construction (C): Three rows of 1" USG Coreboard spaced at least 1½" apart in metal angle runners; ½" SHEETROCK SW face layers laminated and screw attached to outer rows; joints finished. **Construction (D):** Same as (C) but with air space of one side increased to accommodate 1½" THERMAFIBER Sound Attenuation Blankets stapled to back of one coreboard row.

Allowable Maximum Height

Width Between Restraint	Max. Ceiling Height
Up to 10'	10'
10' to 14'	9'
Over 14'	8'

ADVANTAGES

2-Hour Fire Rating with Constructions (A) and (B).

Sound Control—60 STC (lab test) and 56 STC (job test) with Construction (A), 46 STC with (B), 59 STC with (D), 53 STC with (C).

Light Weight—Appreciably less than masonry partitions with equal sound efficiency.

Versatile—Outstanding for party walls and pipe chases; adapts to any module.

MATERIALS

1. **Faceboards**— $\frac{1}{2}$ " thick, 48" wide Tapered Edge SHEETROCK SW Wallboard—lengths as required.
2. **Coreboard**—1" thick, 24" wide, USG "V" T&G Edge Gypsum Coreboard—lengths as required.
3. **Runners**— $1\frac{3}{8}$ "x $\frac{7}{8}$ "x24 ga. Metal Angle Runners.
4. **Adhesive**—PERF-A-TAPE Joint Compound-Taping (for fire-rated construction) or DURABOND 500 Mastic Contact Adhesive.
5. **Fasteners**—USG Brand Screws— $1\frac{1}{4}$ " Hi-Lo Type S, $1\frac{1}{2}$ " Type G.
6. **Metal Trim**—(choose type from Chapter 2).
7. **Joint Treatment**—Select a U.S.G. Joint System.
8. **Insulation**— $1\frac{1}{2}$ "x24"x48" THERMAFIBER Sound Attenuation Blankets.
9. **USG Control Joint No. 093.**
10. **Acoustical Caulking.**

INSTALLATION

Align metal angle runners accurately at the floor and ceiling according to the partition layout. Follow instructions for positioning, attaching, and caulking runners shown in Chapter 3.

Cut coreboard to fit accurately between floor and ceiling runners and install vertically with tongue edge leading. Fasten coreboard to vertical flanges of both floor and ceiling runners with $1\frac{1}{4}$ " Type S screws placed 3" away from coreboard edge. Screws should hold coreboard snugly against runner flange without breaking paper. Face tongue of coreboard in septum row in opposite direction from tongues in outer coreboard rows. Stagger joints in septum row from joints in outer coreboard rows.

At partition intersections and corners, nail coreboards together with 10d common nails spaced 24" o.c. Mark center line of intersecting coreboard to center the nail.

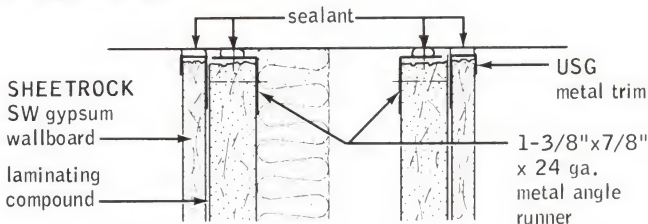
Cut face panels to full floor-to-ceiling height, less $\frac{1}{2}$ " for clearance and caulking space. Apply laminating adhesive, laminate to coreboard with joints offset at least 3" from coreboard joints (see Chapter 3 for laminating procedure). Install face boards with $\frac{1}{4}$ " space at top and bottom and at vertical intersections with terminal walls. Permanently attach face layers with $1\frac{1}{2}$ " Type G screws. Avoid flexing walls before adhesive dries in order to prevent bond failure.

Install $1\frac{1}{2}$ " THERMAFIBER Sound Attenuation Blankets to the back of one coreboard row according to the procedure shown in Chapter 3.

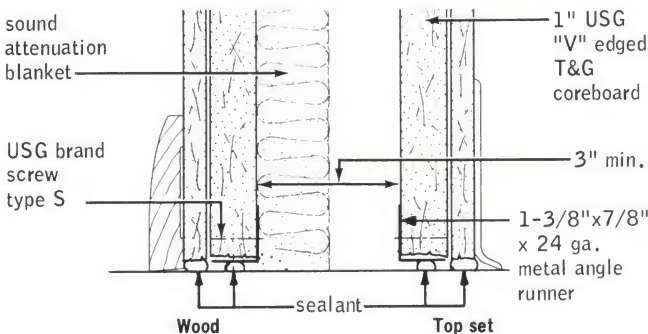
Apply metal trim and corner bead, caulk perimeter and treat all joints, fastener heads and trim as directed in Chapter 3.

Double solid partition details

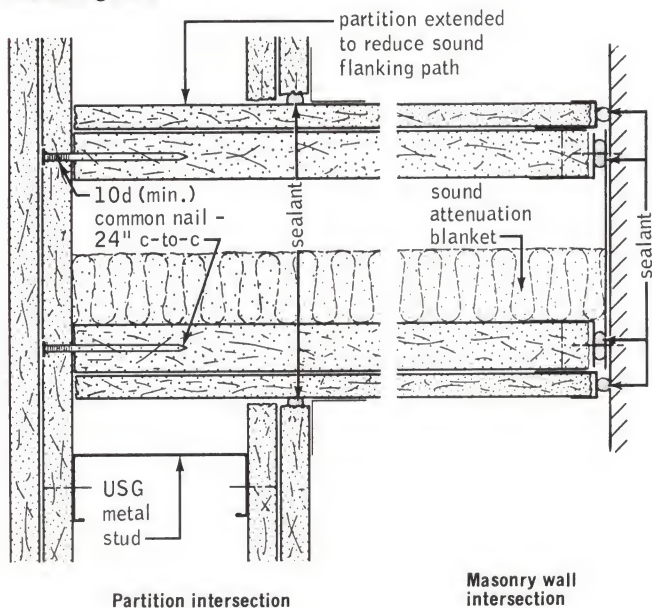
Ceiling attachment

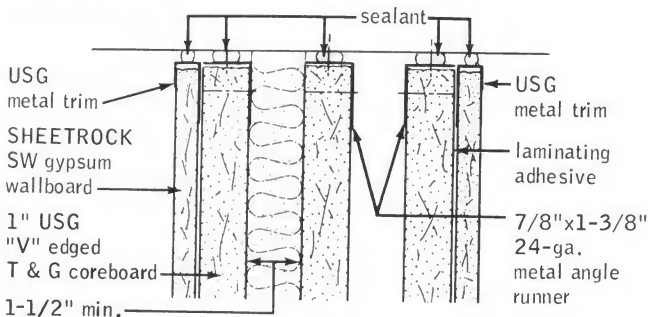
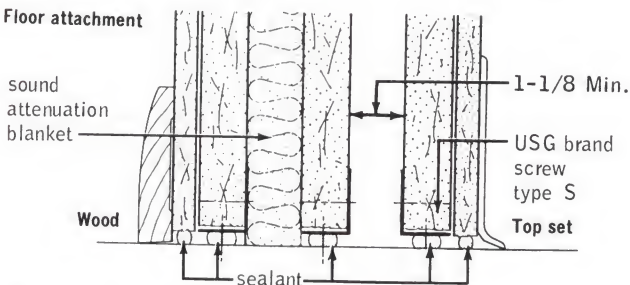
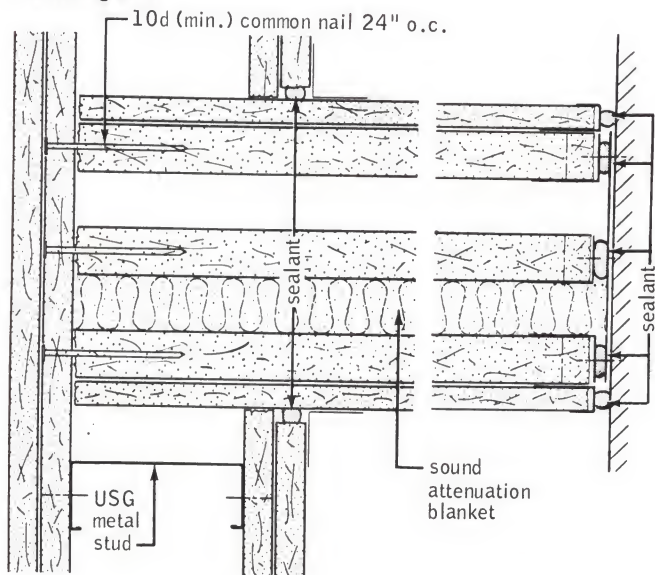


Floor attachment



Intersecting walls



Triple solid partition details**Ceiling attachment****Floor attachment****Intersecting walls****Partition intersection****Masonry wall intersection**



wallboard-masonry partition

SHEETROCK Gypsum Wallboard, adhesively applied directly to interior, above-grade, monolithic concrete or unit masonry, provides durable incombustible drywall surfaces to these walls. Where **SHEETROCK** is laminated to **PYROBAR** Partition Tile, this non-load bearing assembly offers excellent fire protection, light weight, low cost, and is highly suited for vent and elevator shaft enclosures.

For **PYROBAR** tile partitions, surface is sealed with cold-water wall size; wallboard is laminated using **DURABOND 500** Mastic Contact Adhesive.

For interior monolithic concrete, concrete block, brick, unglazed tile and other porous unit masonry, the wallboard is laminated without sizing, using **DURABOND 500** Adhesive.

Either regular or predecorated facings may be applied. Use the Metal Furring Channel System described in this Chapter for wallboard application to exterior and below-grade wall surfaces. The inside of exterior cavity walls having a continuous (1" minimum) clear air space between exterior masonry and masonry or concrete, with *the outside surfaces of the interior masonry well damp-proofed*, may be considered here, as an interior wall surface.

ADVANTAGES

Fire Resistance—Up to 3 hours (est) using 3" solid **PYROBAR** Gypsum Tile.

Easily Decorated—Smooth durable surfaces are suitable for any type decorative treatment.

Versatile—Readily applied to existing or new masonry surfaces.

MATERIALS

1. **Gypsum Board**— $\frac{3}{8}$ " , $\frac{1}{2}$ " or $\frac{5}{8}$ " thick, 48" wide Tapered Edge SHEETROCK SW; $\frac{3}{8}$ " thick, 48" wide ULTRAWALL; $\frac{1}{2}$ " thick, 48" wide TEXTONE Vinyl Panels—lengths as required.
2. **Adhesive**—DURABOND 500 Mastic Contact Adhesive.
3. **Metal Trim**—(choose type from Chapter 2).
4. **Corner Bead**—DUR-A-BEAD, PERF-A-BEAD or ECONO Corner Reinforcement.
5. **Joint Treatment**—Select a U.S.G. Joint System.
6. **Sealer**—(For PYROBAR) Cold Water Wall Size as manufactured by Lepage's or equal.
7. **Partition Tile**—PYROBAR Partition Tile and Cement as specified in U.S.G.'s Architectural Technical Literature.
8. **USG Control Joint No. 093.**

INSTALLATION**Preparation**

Mortar joints on surface of unit masonry to which wallboard is to be bonded should be cut flush with the masonry to provide an even surface. The wall surface should be plumb and true to dimensions. Rough or protruding areas must be ground off before laminating is started. Pockets or holes greater than 4" in diameter and $\frac{1}{8}$ " deep must be filled with grout, mortar, or joint compound and allowed to dry before laminating.

The masonry surface must have all form oils, grease and other release agents removed. It must be dry and free of dust, loose particles and efflorescence. Apply cold-water size to PYROBAR tile.

If a wood base is used, attach a wood nailer to the wall with mechanical fasteners before laminating wallboard. Nailer should be equal to the panel thickness and at least $1\frac{1}{2}$ " high (or $\frac{3}{4}$ " less than wood base height).

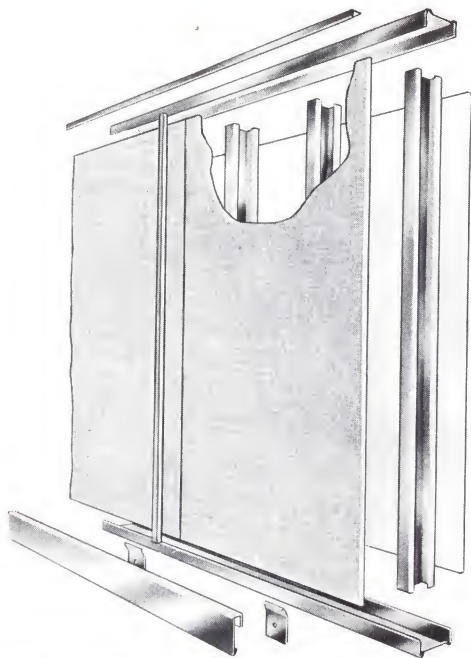
Panel Erection

Cut floor-to-ceiling-height panels for vertical application. Allow for a continuous clearance ($\frac{1}{8}$ " to $\frac{1}{4}$ ") at the floor. Spread DURABOND 500 Adhesive uniformly at center and near the edges of each panel. Each strip of adhesive consists of four beads, $\frac{1}{4}$ "x $\frac{1}{4}$ " and spaced 2" o.c. Strips can be applied with an Ames laminating spreader or a metal spreader having $\frac{1}{4}$ "x $\frac{1}{4}$ " notches, spaced as required.

Position panels vertically over the wall surface and press into place. Use a rubber mallet to impact over the entire surface 16" o.c., including edges and ends, to insure adequate bond.

Finishing

Install metal trim at all wall and ceiling intersections with other types of masonry. Apply metal trim and corner bead and treat all joints, temporary nail holes, fastener heads and trim as directed in Chapter 3. Apply reinforcing tape along the full length of joint.



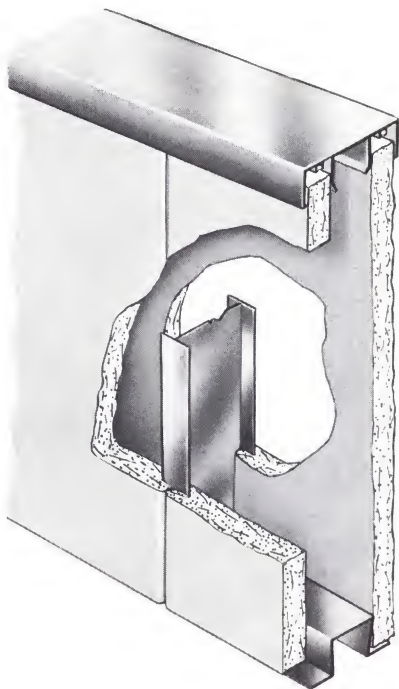
movable partitions

USG demountable partitions

USG Demountable Partitions offer complete flexibility in use and virtual 100% reusability. They have one of the highest sound ratings among movable drywall partitions and yet are among the least expensive. Available in ceiling, cornice or bank rail heights, these incombustible partitions are non-load bearing, yet structurally sound and suitable for use in modernization or all types of new construction. The simplified, coordinated parts are readily available from dealer stocks; they erect quickly and require no special contractor training for assembly or relocation. Electric utilities are rapidly installed or changed.

These non-load bearing assemblies consist of individual wall sections erected from 2½" metal studs set in metal runners and faced with ½" TEXTONE vinyl-faced panels or regular SHEETROCK Wallboard 4' wide. Anodized aluminum battens, base and exterior corners to conceal joints and edges are among the special accessories (see Chapter 2) designed for fast erection. Wall-ceiling trim, door assembly and glazed opening components also are furnished to complete the line.

With sound attenuation wool installed in stud cavity and ½" FIRECODE "C" Wallboard facings, the system is rated at 1 hour and 49 STC. The partition's 3½" thickness permits quick installation or relocation of mechanical services. Limiting height is 12'.

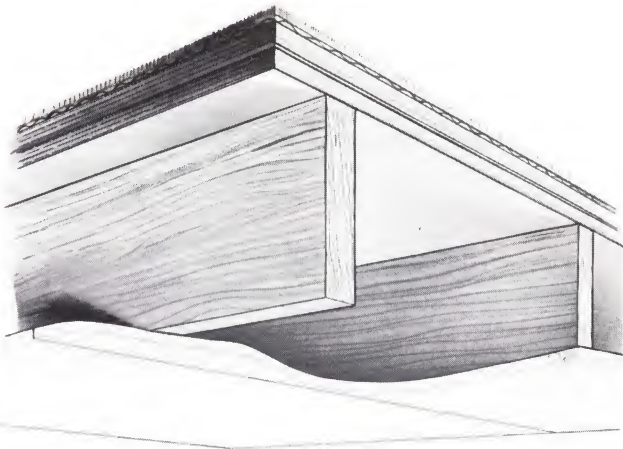


E-Z WALL partitions

E-Z Wall Partitions are hollow, flush-panel type assemblies distinguished for quick erection, ready movability, and high fire and sound resistance. With special kerfed gypsum board FIRECODE Panels and 1½" THERMAFIBER Sound Attenuation Blankets in stud cavity, the system has a 1-hour fire rating; with plain panels and 2" sound attenuation wool, a 45 STC. Panels, ¾" thick and 24" wide, are attached to steel H-studs which form excellent chaseways. Panels are available either vinyl-faced or plain.

Fewer than 50 components are needed to provide a choice of ceiling, cornice or bank rail heights. Steel floor runners, anodized aluminum trim, and exposed beveled joints are used. No special panel sizes or fillers are necessary. Non-load bearing; limiting height, depending on construction, varies from 10 to 14 ft. Installed by authorized erectors.

E-Z WALL Partitions are covered by U.S. Patents No. 3,027,605 and 2,909,251.



ceilings

single layer ceilings

Single layer drywall ceilings provide economical, quickly completed ceilings in wood frame construction. SHEETROCK SW Gypsum Wallboard is applied horizontally (across the supports) to 2x10 wood joists 16" o.c. Attachment may be with nails or screws. Where no fire rating is required the Adhesive Nail-On Method may be used. To upgrade job quality, Back-Blocking of butt joints and Floating Interior Angles may be used. Joints and fasteners are finished with a U.S.G. joint system.

Using FIRECODE "C" Wallboard in wood joist floor/ceiling construction, a 1-hour fire rating has been obtained with 1/2" thick board. A 5/8" thick FIRECODE assembly will provide the same rating. With Insulating (foil back) SHEETROCK SW Wallboard the system is effective as a vapor barrier and offers significant insulating value.

ADVANTAGES

Fire Resistance—1-hour rating with 1/2" FIRECODE "C" or 5/8" FIRECODE Wallboard.

Versatile—Widely accepted for interior ceilings in all types of wood framed residential and commercial buildings.

Economical—Quickly erected using low cost materials.

MATERIALS

1. Gypsum Board—48" wide—(3/8") (1/2") (5/8") thick Tapered Edge SHEETROCK SW (Regular) or (Insulating—foil-back); 5/8"

200 systems/double layer ceiling

thick SHEETROCK SW FIRECODE; (1/2") (5/8") thick SHEETROCK SW FIRECODE "C" Wallboard—lengths as required.

2. Joint Treatment—Select a U.S.G. Joint System.

3. Adhesive

—(for Back-Blocking System)—PERF-A-TAPE Joint Compound-Taping or DURABOND 200 or 300 Stud Adhesive.

—(for Adhesive Nail-On Board Application)—DURABOND 200 or 300 Stud Adhesive.

4. Fasteners

—Screws—1 1/4" USG Brand Screw Type W.

—Nails (choose type from Chapter 2).

5. Metal Trim—(choose type from Chapter 2).

6. Corner Bead—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement.

7. USG Control Joint No. 093.

INSTALLATION

Install wallboard, fasteners, metal accessories and joint treatment according to methods described in Chapter 3. For fire-rated construction space nails not to exceed 6" o.c.

double layer ceilings

In wood-framed construction, double layer systems create the finest ceiling surfaces available with gypsum wallboard. By job-laminating SHEETROCK SW Wallboard to a base layer of BAXBORD Gypsum Backing Board, the possibility of imperfections due to ridging and surface fasteners is minimized. Greater strength, fire protection, and resistance to sound transmission are also added.

ADVANTAGES

Fast Erection—Cuts building time; permits early occupancy.

Low Maintenance—Easy decoration; reduced possibility of fastener "pops" and discoloration over fastener heads.

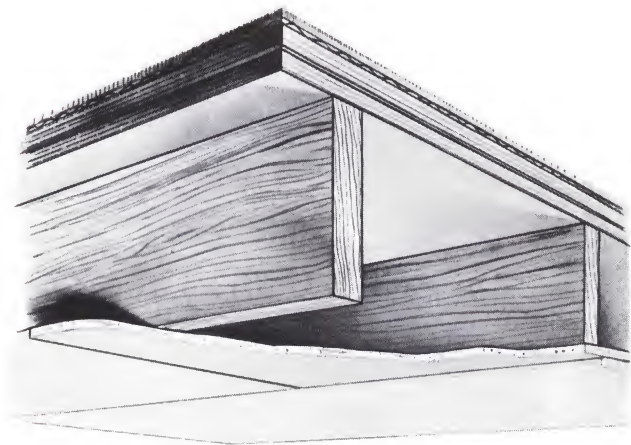
Economical—Low-cost materials produce greater strength, fire and sound resistance.

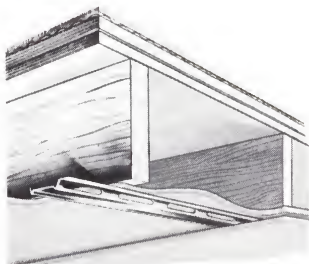
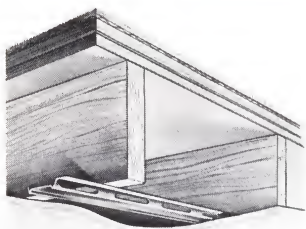
MATERIALS

- 1. Faceboards**—48" wide—($\frac{3}{8}$ " ($\frac{1}{2}$ " ($\frac{5}{8}$ " thick Tapered Edge SHEETROCK SW; ($\frac{1}{2}$ " ($\frac{5}{8}$ " thick SHEETROCK SW FIRECODE—lengths as required.
- 2. Backing Board**—48" wide—($\frac{3}{8}$ " ($\frac{1}{2}$ " ($\frac{5}{8}$ " thick (Tapered Edge) (Insulating) SHEETROCK SW; ($\frac{1}{2}$ " ($\frac{5}{8}$ " SHEETROCK SW FIRECODE; ($\frac{3}{8}$ " ($\frac{1}{2}$ " ($\frac{5}{8}$ " thick BAXBORD Gypsum Backing Board; ($\frac{1}{2}$ " ($\frac{5}{8}$ " thick BAXBORD FIRECODE—lengths as required.
- 3. Joint Treatment**—Select a U.S.G. Joint System.
- 4. Adhesive**—PERF-A-TAPE Joint Compound-Taping (for fire-rated construction) or DURABOND 600 or 500 Contact Adhesive.
- 5. Fasteners**
 - Screws—USG Brand Screws 1 $\frac{1}{4}$ " Type W, 1 $\frac{1}{2}$ " Type G.
 - Nails—(choose type from Chapter 2).
 - Staples—16 ga. flat galvanized wire, $\frac{1}{2}$ " wide, (1") (1 $\frac{1}{8}$ ") (1 $\frac{1}{4}$ ") long with divergent points.
- 6. Metal Trim**—(choose type from Chapter 2).
- 7. Corner Bead**—DUR-A-BEAD, PERF-A-BEAD or ECONO Corner Reinforcement.
- 8. USG Control Joint No. 093.**

INSTALLATION

Install backing boards, face boards, fasteners, metal accessories, caulking, and joint treatment according to methods described in Chapter 3.





resilient channel ceilings

Ceiling assemblies using the RC-1 Resilient Channel provide low cost and superior sound isolation and up to 2-hour fire ratings for wood joist floor/ceiling construction—qualities particularly needed in motels and apartments. The RC-1 Resilient Channels are attached 24" o.c. at right angles to the wood joists with USG Brand Screws; wallboard is screw-attached with USG Brand Hi-Lo Screws.

With a double layer assembly of $\frac{5}{8}$ " SHEETROCK SW FIRECODE "C" Wallboard separated by RC-1 Resilient Channels, a 2-hour fire-resistance rating is provided. With $\frac{1}{2}$ " FIRECODE "C" Wallboard in this double layer assembly, a $1\frac{1}{2}$ -hour rating is available.

The one-hour fire rating for wood joist floor-ceiling construction has been obtained by using $\frac{1}{2}$ " FIRECODE "C" Wallboard and by $\frac{5}{8}$ " FIRECODE. The system has an effective vapor barrier and provides significant insulating value when Insulating (foil-back) SHEETROCK is used. The assembly should not be used beneath highly flexible floor joists.

ADVANTAGES

Fire Resistance—Up to 2 hours with double layer assemblies; 1-hour rating with $\frac{1}{2}$ " FIRECODE "C" Wallboard.

Sound Control—Resilient attachment provides superior sound transmission loss values.

Economical—Low-cost materials; speedy erection.

MATERIALS

- 1. Gypsum Board**—48" wide—($\frac{1}{2}$ ") ($\frac{5}{8}$ ") thick Tapered Edge SHEETROCK SW (Regular) or (Insulating—foil back); ($\frac{1}{2}$ ") ($\frac{5}{8}$ ") thick SHEETROCK SW FIRECODE—lengths as required.
- 2. Resilient Channels**—RC-1 SHEETROCK Resilient Channel.
- 3. Fasteners**—USG Brand Screws: $1\frac{1}{4}$ " Type W; $\frac{7}{8}$ ", 1", $1\frac{1}{4}$ " or $1\frac{7}{8}$ " Hi-Lo Type S; Nails: 6d cement coated.
- 4. Joint Treatment**—Select a U.S.G. Joint System.
- 5. Adhesive**—(for Back-Blocking)—PERF-A-TAPE Joint Compound-Taping.
- 6. Metal Trim**—(choose from Chapter 2).
- 7. Acoustical Caulking.**

INSTALLATION

Resilient Channels—Attach RC-1 SHEETROCK Resilient Channels at right angles to wood joists. Use 1¼" Type W or Type S screws driven through the pre-punched holes in the channel flange for single layer construction. In hard wood, ⅞" or 1" Hi-Lo Type S screws may be used to attach channels to joists. For double layer assembly use 1⅞" Hi-Lo Type S screws driven through base layer into joists. Fasten channel to joist at each channel-joist intersection. Do not use nails to attach channel to joists in either single or double layer system.

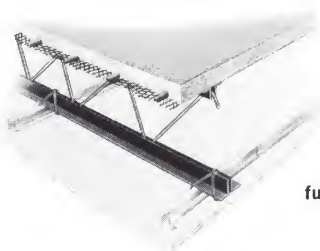
Locate channels within 6" of the wall-ceiling intersection and no more than 24" o.c. Extend channels into all corners and fasten to corner framing. Do not cantilever channels more than 6". Splice channel directly under joists by nesting the channels and screwing through both flanges to the support.

Wallboard—Apply base layer wallboard with the long edge across joists and with end joints staggered. Fasten with 6d cement coated nails spaced 1", 6" and 21" from each edge in field of board and with additional nails 15" from edge at end joints.

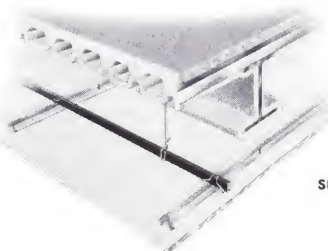
Apply face layer wallboard of maximum practical length with the long dimension at right angles to the resilient channels with end joints staggered and neatly fitted. Attach wallboard with Hi-Lo Type S screws spaced 12" o.c. in the field of the board and along abutting ends. Use ⅞" screw length for ½" thick board; 1" length for ⅝" thick board. Center end over the web surface of the resilient channel or center midway between channels and backblock. Use a minimum 21" cut length of resilient channel for backing behind butt joints. Properly support wallboard around all cut-outs and openings in the ceiling.

Finishing Ceiling—Apply metal trim and caulking; treat all joints and fastener heads as directed in Chapter 3.





furred ceiling



suspended ceiling

metal furring channel ceilings

Metal Furring Channel Systems conceal and protect structural and mechanical elements within a lightweight fire resistant ceiling of gypsum board. USG Metal Furring Channels, to which the wallboard is screw-attached, are wire-tied to bar joists, clipped or wire tied to suspended 1½" main runner channel grillage. For long-span requirements beneath large ducts or pipes, USG Metal Studs are substituted for furring channels (see table below for component spacing). With Insulating (foil back) SHEETROCK SW Wallboard the system is effective as a vapor barrier and provides significant insulating value. Lower cost BAXBORD Gypsum Backing Board provides a firm base for acoustical tile adhesively applied.

FIRE AND SOUND RATED CONSTRUCTION

Construction (A): ⅝" SHEETROCK SW FIRECODE "C" Wallboard; furred USG Metal Furring Channels 24" o.c.; wallboard attached with 1" Type S drywall screws 12" o.c.; joints exposed or finished with a U.S.G. joint system; 3" concrete on riblath over bar joists.

Construction (B): Same as (A) with 2½" concrete, furred or suspended Metal Furring Channels and ½" SHEETROCK SW FIRECODE "C" Wallboard. **Construction (C):** Same as (B) with ⅝" SHEETROCK SW FIRECODE Wallboard.

Construction (D): ⅝" SHEETROCK SW FIRECODE Wallboard; furred or suspended Metal Furring Channels 12" o.c.; wallboard attached with 1" Type S screws 8" o.c.; joints finished; 2½" concrete on riblath over bar joists. **Construction (E):** ⅝" SHEETROCK SW FIRECODE Wallboard; furred or suspended Metal Furring Channels 24" o.c.; wallboard attached with 1" Type S screws 12" o.c.; joints finished; 2" concrete on riblath over bar joists.

Component Spacing

Type Furring Member		Ceiling Systems—Component Spacing				
		Furring Member c. to c. Spacing		Main Support Member c. to c. Spacing		Hanger Spacing c. to c.
		For wallboard thickness of:				
USG Metal Furring Channel		½"	⅝"	½"	⅝"	4'0"
		24"	24"	4'0"	4'0"	
USG Metal Stud	1⅝" erected with both flanges up and against main support member	24"	24"	5'0"	5'0"	4'0"
	2½"	24"	24"	7'0"	7'0"	
	3⅝"	24"	24"	10'0"	10'0"	

ADVANTAGES

Fire Resistance—3-hour fire rating with Construction (A), includes 3-hour beam; 2-hour rating with (B), includes 2-hour beam; 2-hour rating with (C) and (D); 1½-hour rating with (E).

Versatility—Used in virtually all types of new construction and modernization.

Economy—Low cost materials. Few components and simple installation result in fast erection.

MATERIALS

1. Gypsum Board—(½") (⅝") thick, 48" wide Tapered Edge SHEETROCK SW, (Regular) (Insulating—foil back) (FIRECODE) (FIRECODE "C") Gypsum Wallboard, or BAXBORD Gypsum Backing Board—lengths as required.

2. Furring Channels—USG Metal Furring Channel and/or USG Metal Studs—No. 158 (1⅝")—212 (2½")—358 (3⅝").

3. Fasteners—USG Brand Hi-Lo Screws, ⅞" or 1" Type S.

4. Joint Treatment—Select a U.S.G. Joint System.

5. Metal Trim—(choose type from Chapter 2).

6. Grillage Accessories

- Metal Furring Channel Clip.
- 1½" Cold Rolled Channels.
- 9 ga. Galvanized Hanger Wire.
- 16 or 18 ga. Galvanized Tie Wire.

7. USG Control Joint No. 093.

8. Acoustical Caulking.

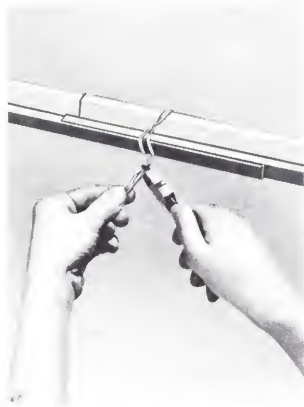
INSTALLATION

Install Main Runner Channels—Anchor 9 ga. galvanized hanger wires to structural frame or embed them in concrete slabs. Space hangers at no more than 4'0" intervals along the 1½" cold rolled channels used as main runners. Determine main runner spacing from Component Spacing Table. Level runners and saddle tie hangers to runners. Place runner channels within 6" of walls to support furring channel ends. Keep main runners from contacting abutting masonry walls.

Fasten Furring Channels—Position USG Metal Furring Channels (or USG Metal Studs) at right angles to 1½" main runner channels and space according to gypsum board thickness or specifications.

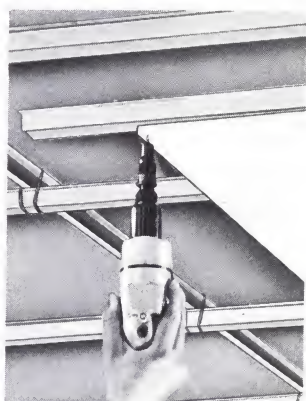
Attach furring channels securely to main runners with Metal Furring Channel Clips or saddle tie to main runners or support members with two strands of 16-ga. or three strands of 18-ga. galvanized tie wire (see illustration below). Install Furring Channel Clips on alternate sides of main runners. Wire tie furring channel to main runner when clips cannot be alternated. When using USG Metal Studs, wire-tie with one flange against the main supports or runners to provide a firmer support for attachment of wallboard and to minimize distortion or twisting. Keep furring channels and studs from contacting abutting masonry walls.

At light troffers or any openings that interrupt the main runner or furring channels, reinforce grillage with ¾" cold rolled channels wire tied atop and parallel to the main runner channels.



Furring Channel Splices—Long runs of USG Metal Furring Channels or USG Metal Studs used as ceiling furring members must be end-spliced. Nest one channel or stud inside the other to a depth of at least 8" and securely wire-tie together at center of splice (see illustration above). When USG Metal Studs are installed, splice them by springing open flanges of one stud and inserting other stud into it to a depth of at least 8". Securely wire-tie together at center of splice. Do not screw or permanently fasten end splices together.

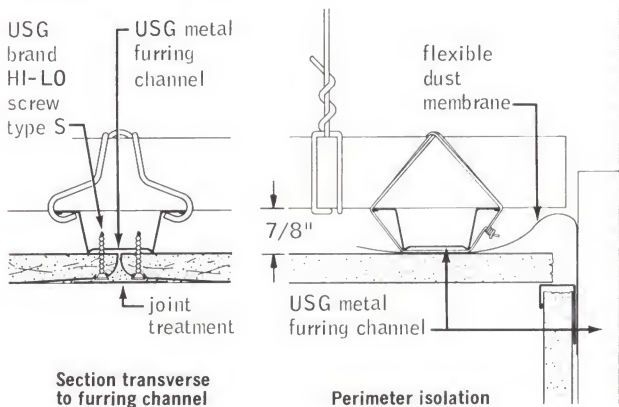
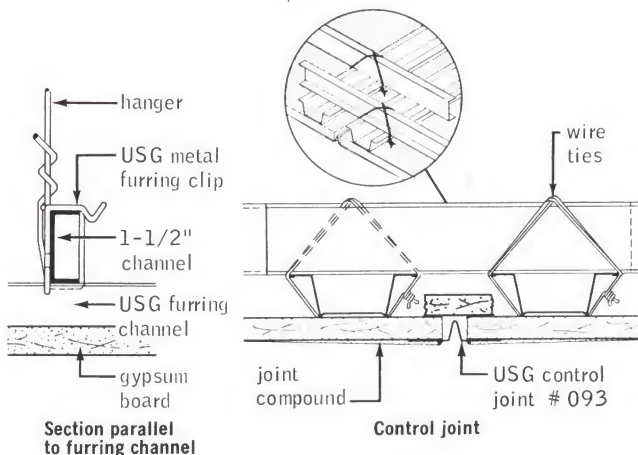
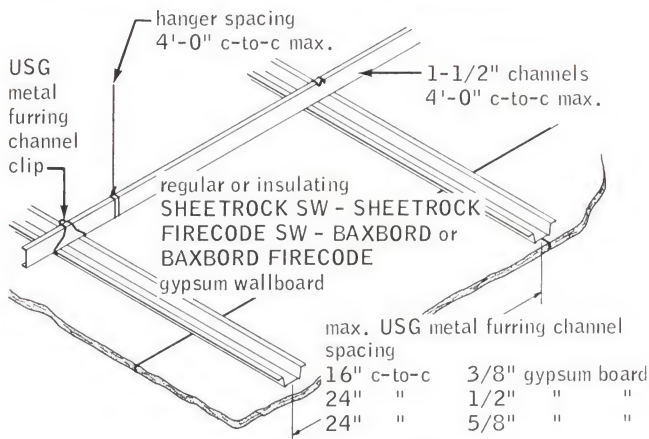
Panel Erection—Apply gypsum wallboard of maximum practical length with the long dimension at right angles to the furring channel (see below). Center end joints over furring channels; fit joints neatly and accurately; stagger end joints from those in adjacent panel rows. Fasten wallboard to furring channels with Type S Hi-Lo screws spaced 12" o.c. in field of board and along abutting ends. Use $\frac{7}{8}$ " screw length for $\frac{1}{2}$ " thick board, 1" length for $\frac{5}{8}$ " thick board.

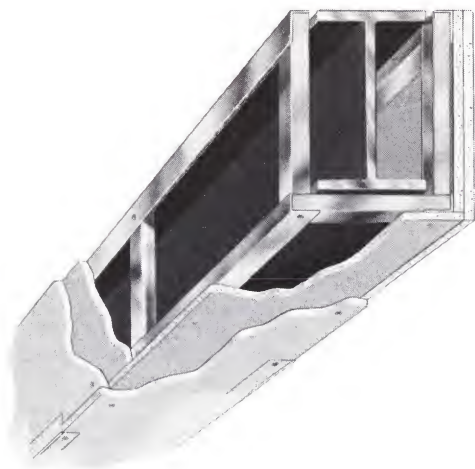


Back-Blocking Technique—When a fire-rated method of back-blocking is desired, float wallboard end joints between furring channels. Place a 5' length of Metal Furring Channel over and parallel to each end joint where one of the end joint-panels is installed (see above). Six inches of channel must rest on each wallboard panel adjacent to end joint-panels. While holding end joint-panel and furring channel firmly together, fasten them with Type S Hi-Lo screws at 12" intervals. Install mating end joint-panel and fasten to 5' furring channel in same way. It is not necessary to wire-tie furring channel to carrying channels.

End joints may be aligned in some fire-rated constructions if desired for installation of control joints. Where end joints are aligned, support each abutting end of panel with a continuous furring channel wire tied to joists and spaced 2" from end of panels. Protect joint from above with 2" wide face panel strips laid over the joints.

Finishing Ceiling—Apply metal accessories, caulk around openings and at perimeter, treat all joints, fastener heads and trim as directed in Chapter 3.





caged beam construction

U.S.G. Caged Beam Constructions consist of a double or triple layer of $\frac{5}{8}$ " SHEETROCK Wallboard screw-attached to a framework of USG Metal Runner channel brackets and USG Metal Runners or $1\frac{3}{8}$ "x $\frac{7}{8}$ " sheet metal angles paralleling the beam. They are lightweight, fast and economical methods of housing beams with a highly decorable surface. The constructions provide a 3-hour or 2-hour fire rating for beams supporting 2½" concrete on the fluted steel floor units.

MATERIALS

1. **Channel Brackets**—USG Metal Runner No. 158.
2. **Runners**—USG Metal Runners No. 158 or $1\frac{3}{8}$ "x $\frac{7}{8}$ "x24 ga. galvanized metal angle runners.
3. **Gypsum Board**— $\frac{5}{8}$ " thick, 4' wide Tapered Edge SHEETROCK SW FIRECODE Wallboard—lengths as required.
4. **Fasteners**—USG Brand Screws, 1", 1¼", 1½", 1⅞" and 2¼" Hi-Lo Type S and ½" Type S-12 pan head.
5. 1"-20 ga. galvanized hexagonal wire mesh.
6. **Corner Bead**—No. 103 DUR-A-BEAD Corner Reinforcement.
7. **Joint Treatment**—Select a U.S.G. Joint System.

INSTALLATION

Suspension System Erection—Erect ceiling runners parallel to and at least ½" away from beam. Metal angles should be positioned with the $1\frac{3}{8}$ " leg vertical. Fasten ceiling runners to steel floor units with ½" Type S-12 pan head screws spaced 12" o.c.

Fabricate channel brackets from No. 158 Metal Runners to allow ½" clearance at bottom of beam for 2-hr. construction and 1"

clearance for 3-hr. assembly. When USG Metal Runners are used for corner runners, cope or cut away legs of runner used for brackets to allow insertion of corner runner. When metal angles are used for corner runners, slit channel bracket runner legs and bend runner to right angle. Install channel brackets 24" o.c. along the length of the beam and fasten to ceiling runner with $\frac{1}{2}$ " Type S-12 pan head screws.

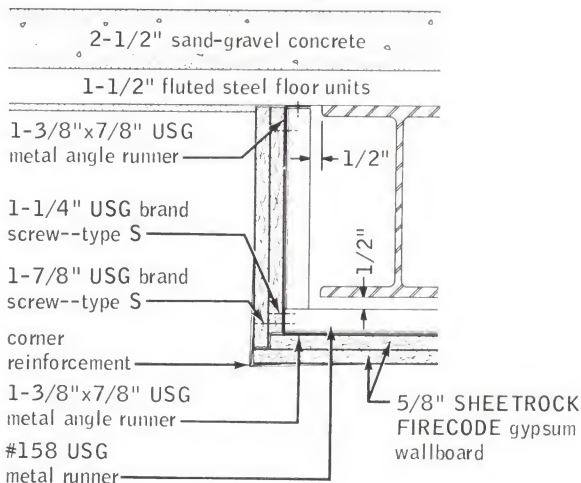
Install lower corner runners parallel to beam. Set USG Metal Runner corner runners in coped channel brackets. Apply metal angles to outside of channel brackets with the $\frac{7}{8}$ " leg vertical and fasten with $\frac{1}{2}$ " Type S-12 pan head screws.

Wallboard Erection—For 2-hour assemblies, apply vertical base layer panels and attach to ceiling and corner runners with $1\frac{1}{4}$ " Type S screws spaced 16" o.c. Install base layer to beam soffit overlapping vertical side panels and fasten with $1\frac{1}{4}$ " Type S screws 16" o.c. Apply face layer panels so soffit panel supports vertical side panels. Fasten face layer to runners with $1\frac{7}{8}$ " Type S screws spaced 8" o.c.

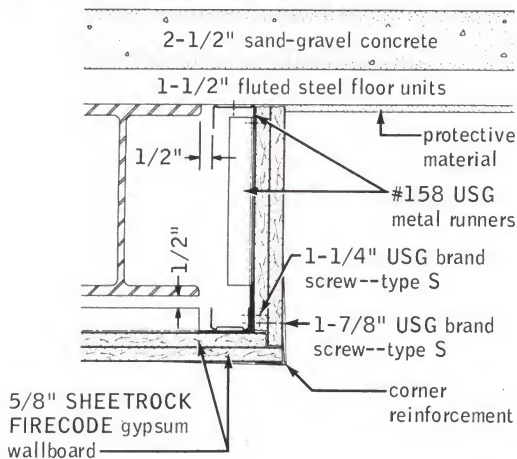
For 3-hour assembly, apply base layer panels and attach to ceiling and corner runners with 1" Type S screws spaced 16" o.c. Apply middle layer over base layer and attach to brackets and runners with $1\frac{5}{8}$ " Type S screws spaced 16" o.c. Install hexagonal mesh over middle layer at beam soffit. Extend mesh $1\frac{1}{2}$ " up sides of beam and hold in place with $1\frac{5}{8}$ " screws used to attach middle layer. Apply face layer over middle layer and wire mesh and fasten to brackets and runners with $2\frac{1}{4}$ " Type S screws spaced 8" o.c. Apply all layers so soffit panels support vertical side panels.

Finishing Construction—Apply corner bead to bottom outside corners of face layers and finish with joint treatment as directed in Chapter 3.

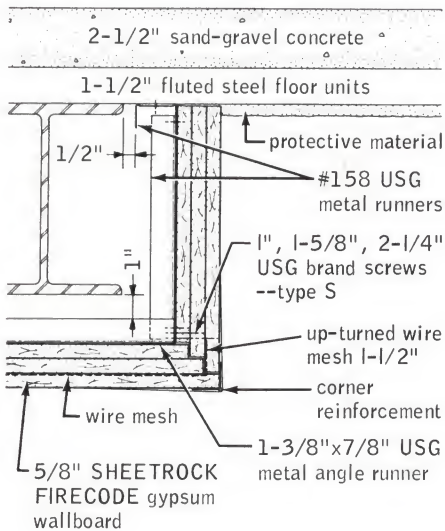
Design no. 254—2 hr. (beam only)

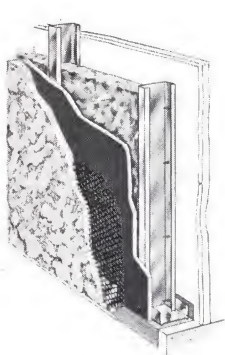
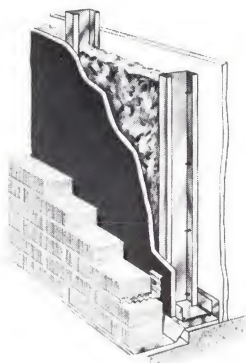
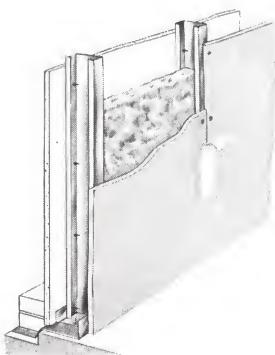
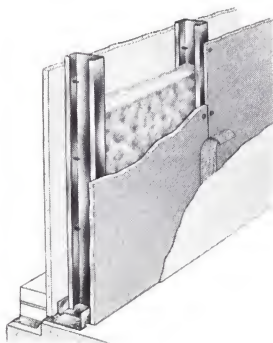


Design no. 255—2 hr. (beam only)



Design no. 214—3 hr. (beam only)



**Stucco exterior****Masonry exterior****Gypsum drywall interior****Lath and plaster interior**

exterior walls and furring

USG metal stud curtain wall

USG Metal Stud Curtain Wall Systems offer a versatile new way to enclose a structure at low cost. Fabricated quickly on the job with conventional components, these lightweight, non-load bearing systems are highly insulative and suitable for concrete and steel frame structures.

Basically these systems consist of 20-ga. USG Metal Studs set in runners, FIRECODE Gypsum Sheathing screw-attached to stud exterior and THERMAFIBER Mineral Wool Insulation inserted between studs and stapled to the sheathing. A variety of exterior and interior finishes, as described below, is available to meet design requirements:

Stucco Exterior—Portland cement stucco is applied 1" thick over 3.4-lb. Galvanized Self-Furring Metal Lath which is screw-

attached through the FIRECODE Gypsum Sheathing to the 20-ga. Metal Studs. Stucco surface may be pretinted, painted, textured or accented with colored aggregates.

Masonry Exterior—Face or common brick, 4" thick, is laid with Portland cement-lime mortar. Wall ties, spaced 24" o.c. vertically, are screw-attached through the sheathing to the metal studs.

Gypsum Drywall Interior—Insulating (foil back) SHEETROCK SW Gypsum Wallboard, ½" or ⅝" thick, is screw-attached to the metal studs. Interiors are finished with a U.S.G. joint system and DUR-A-BEAD Corner Reinforcement.

Lath and Plaster Interior—Insulating gypsum lath is screw-attached to metal studs. RED TOP Gypsum Plaster is applied ½" thick over ⅜" ROCKLATH Plaster Base, or IMPERIAL Plaster is applied ⅛" to ⅜" thick over large-size ½" IMPERIAL Base.

USG Metal Stud Curtain Wall Systems are adaptable to many types of structures such as schools, shopping centers, motels and apartments.

ADVANTAGES

Versatility—By varying size and spacings of studs, walls of various heights can be constructed to accommodate wind load requirements up to 15 psf. Interior and exterior facings in various combinations offer flexibility in selecting a surface finished to meet specific functional and esthetic needs.

Fire Resistance—Constructed of incombustible components.

Thermal Insulation—High thermal performance meets the "All Weather Comfort Standards" for electrically heated and air conditioned buildings.

Adaptability—U.S.G. Curtain Walls can be used in most types of steel or reinforced concrete constructions in which the load is carried by the structural framing and not transferred to the curtain wall.

Economy—No new or unusual materials or techniques are required. All components and application procedures are familiar to mechanics.

Only general information for the drywall application is shown herein. For design data on limiting heights for wind loading, heat transfer characteristics, maximum stud and runner fastener spacing; recommendations covering shadowing and spotting, expansion and contraction, air and water infiltration; and complete architectural specifications, see U.S.G. Architectural Technical Folder on USG Metal Stud Curtain Wall.

MATERIALS

1. Studs and Runners

—20-ga. USG Metal Studs—Nos. 212 (2½"), 358 (3⅝"), 600 (6").

—20-ga. USG Metal Runners—Nos. 212 (2½"), 358 (3⅝"), 600 (6").

—Regular USG Metal Studs and Runners—Nos. 158 (1⅝"),

- 212 (2½"), 358 (3⅝"), *for interior facing of chase wall.*
 —USG Metal Furring Channel, *for furred interior wall.*
- 2. Sheathing**—FIRECODE Gypsum Sheathing—½" thick, (2'x8') (4'x8').
- 3. Insulation**
 —THERMAFIBER Metal Stud Insulating Blankets—(2") (3") (3⅝") thick, (16") (24") wide x (48") (96") long.
 —THERMAFIBER Sound Attenuation Blankets—(1½") (2") thick, x (16"x48") (24"x48"). (*Use where incombustibility is required. Use Insulating Type (foil back) interior gypsum wallboard as vapor barrier.*)
- 4. Gypsum Wallboard**
 —Face Boards—Insulating SHEETROCK SW Wallboard, (½") (⅝") thick, 48" wide, lengths as required.
 —Backing Boards—Regular SHEETROCK Gypsum Wallboard, (½") (⅝") thick, 48" wide lengths as required (*for furred wall construction*).
- 5. USG Brand Screws**
 —(1") (1¼") (1⅝") Type S-12 Bugle Head.
 —½" Type S-12, Pan Head.
 —1" Hi-Lo Type S, Bugle Head *for regular USG metal studs and furring channels.*
- 6. Metal Trim**—(Choose type from Chapter 2).
- 7. Corner Bead**—DUR-A-BEAD, PERF-A-BEAD, ECONO Corner Reinforcement.
- 8. Joint Treatment**—Select a U.S.G. Joint System.

INSTALLATION

Studs and Runners

Align runner track accurately according to the exterior wall layout and securely attach to base and head with power-driven fasteners spaced per specifications.

Position studs vertically in the runners and space according to specifications. Securely anchor each stud to runners with four ½" USG Brand Screws Type S-12 Pan Head, two at top and two at bottom, with one screw in each flange.

For chase wall, align additional interior runners accurately at floor and ceiling and securely anchor them with suitable fasteners spaced not more than 24" o.c. Install studs vertically in the runners and space according to specifications. Install studs no more than 2" from all door and window jambs abutting partitions, partition corners and other construction. Anchor all studs located adjacent to door and window frames, partition intersections and corners to runner flanges by positive screw engagement through each stud flange and runner flange.

Exterior Sheathing

Apply FIRECODE Gypsum Sheathing horizontally and screw-attach to the exterior of each stud with 1" USG Brand Screws Type

S-12 spaced $\frac{3}{8}$ " from ends and edges and approximately 8" o.c.

Insulation

Insert THERMAFIBER Metal Stud Blankets between studs and staple to gypsum sheathing using $\frac{9}{16}$ " staples with divergent points placed at each corner and in the center of each blanket.

Wallboard

Install Insulating SHEETROCK SW Gypsum Wallboard vertically or horizontally and attach to studs with 1" USG Brand Screws Type S-12 spaced 8" o.c.

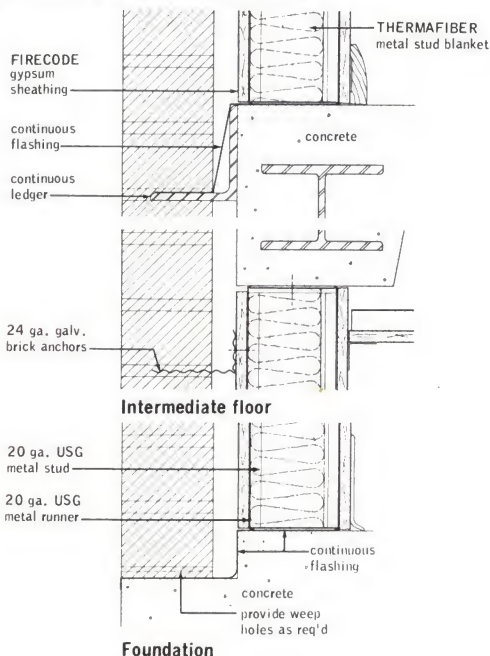
For furred interior construction, apply regular SHEETROCK SW Wallboard vertically or horizontally and attach to studs with 1" Type S-12 screws 8" o.c. Over the first wallboard layer, install USG Metal Furring Channels horizontally 24" o.c. and screw-attach through the wallboard into the metal studs. Attach each channel flange to each stud with 1" Type S-12 screws. Apply a second layer of Insulating SHEETROCK SW Wallboard to furring channels with 1" Hi-Lo Type S screws spaced 12" o.c.

For chase wall interior construction, screw-attach SHEETROCK Wallboard cross braces to the stud webs at quarter points in the partition height. Apply Insulating SHEETROCK SW Wallboard to the interior row of studs with 1" Hi-Lo Type S screws 12" o.c.

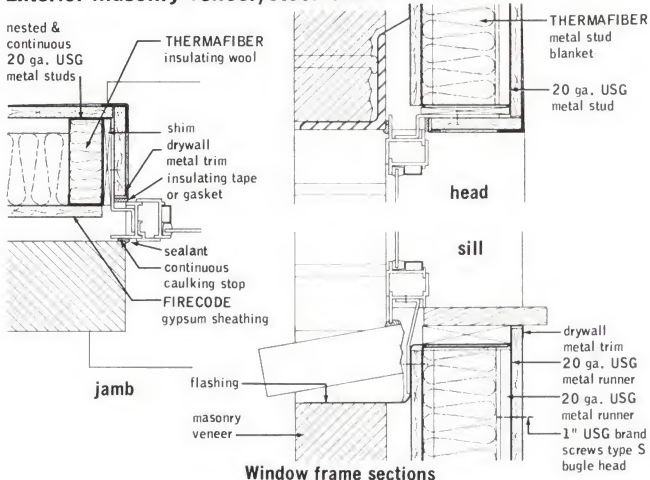
Accessories and Finishing

Apply metal trim and corner bead, caulk perimeter, treat all joints, fastener heads and trim as directed in Chapter 3.

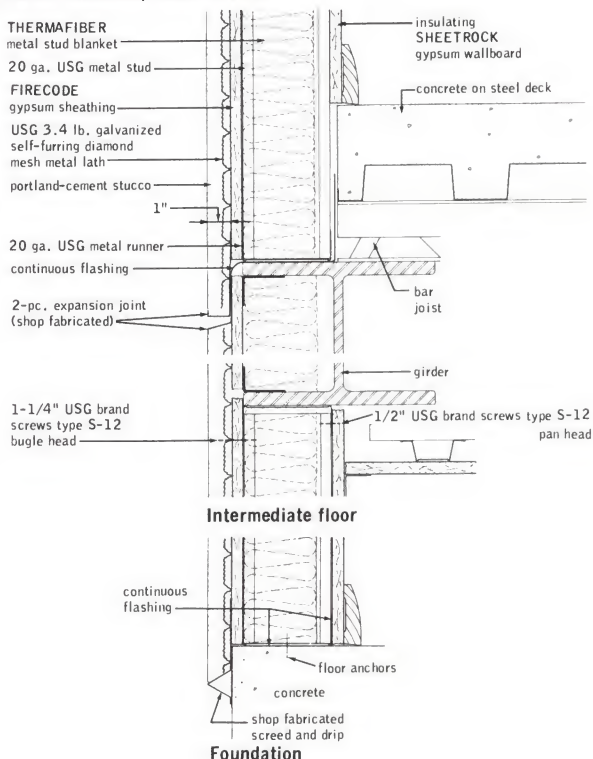
Exterior masonry-veneer/steel frame



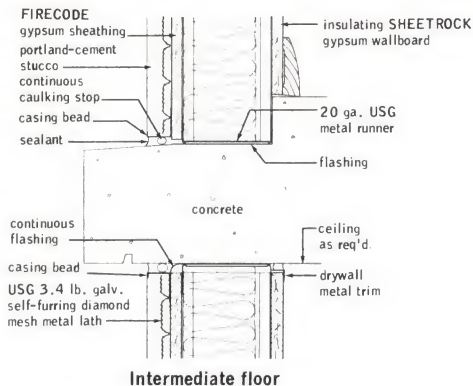
Exterior masonry-veneer/steel frame



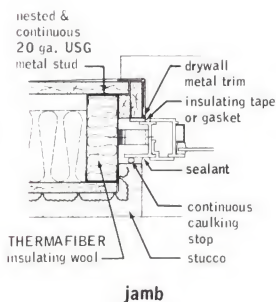
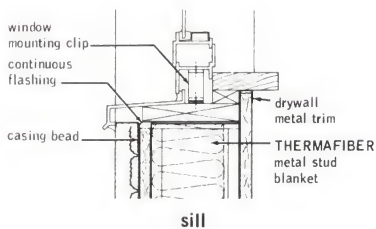
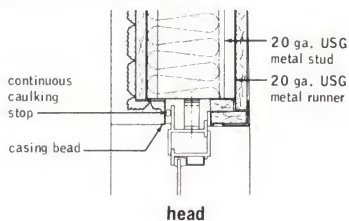
Exterior stucco/steel frame



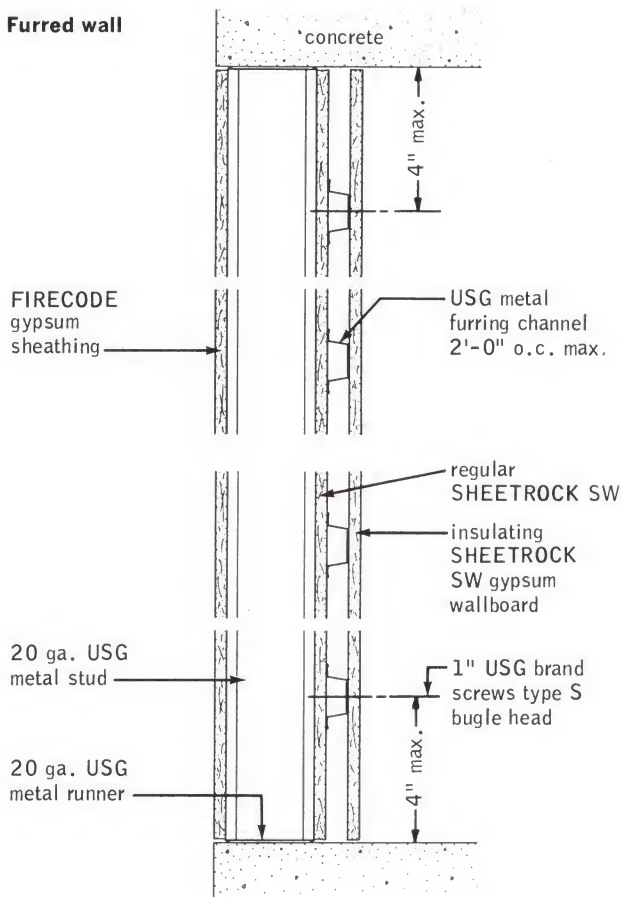
Exterior stucco/steel frame



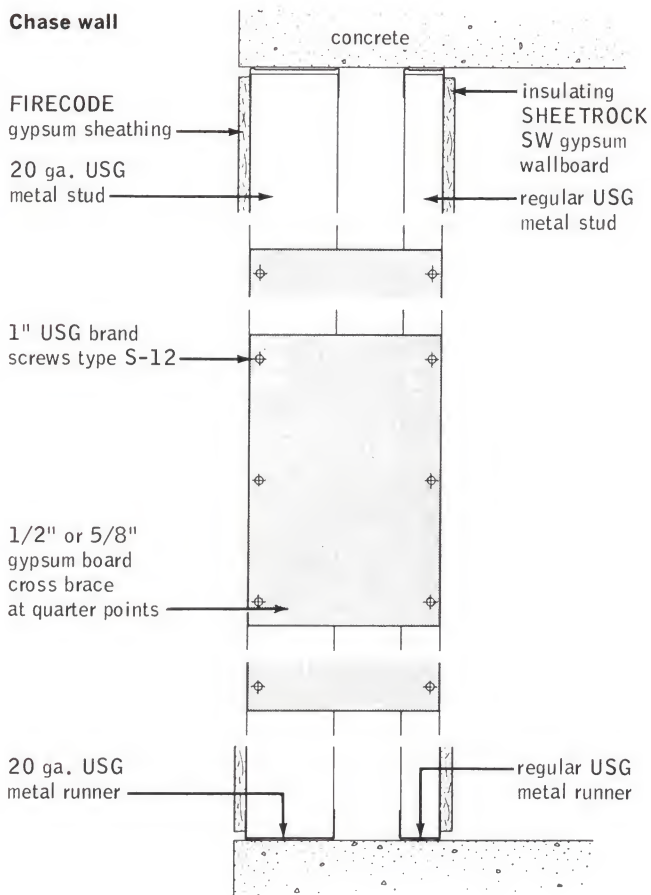
Window frame sections



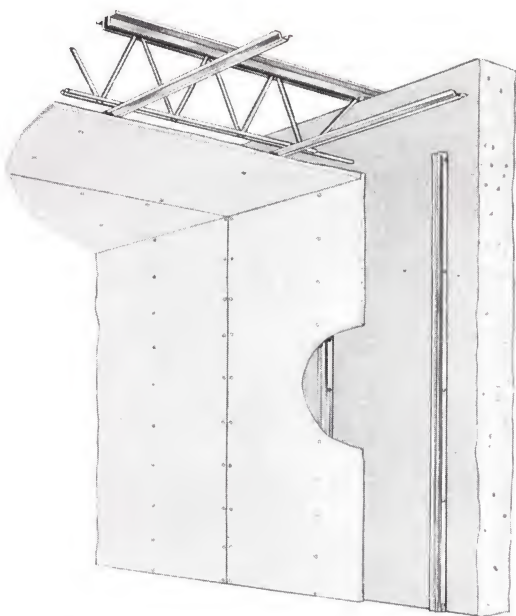
Furred wall



Chase wall



Note: THERMAFIBER metal stud blanket is recommended for use in both chase wall and furred detail



metal furring channel

Drywall Furring of exterior masonry walls is quickly accomplished by using USG Metal Furring Channels to which the wallboard is screw-attached. An effective vapor barrier and significant insulating value are added to walls by using Insulating (foil back) SHEETROCK Wallboard.

The furring channels are attached directly to virtually any type of masonry—brick, tile, gypsum tile, monolithic concrete. To provide additional space for pipes, conduits or ducts the metal channel may be furred out up to 3" with horizontal $\frac{3}{4}$ " cold rolled channels wire-tied to adjustable wall furring brackets. This latter furred construction limited to 12' height; no limiting height for direct attachment.

Temperature differentials in an exterior wall may cause interior condensation which when combined with airborne dust could result in photographing or shadowing over fasteners and furring. Because soiling and temperature differences are variables over which it has no control, United States Gypsum cannot be held responsible for surface blemishes that result. Where temperature, humidity and soiling conditions are expected to cause objectionable blemishes, one-half of a Double Solid Partition is recommended for furring (see separate description in this Chapter).

ADVANTAGES

Versatility—Suitable for new construction or remodeling; used with single or double layer construction over masonry walls.

Insulation and Vapor Barrier—Highly effective with Insulating SHEETROCK facings.

Economy—Simplified components and installation procedures provide one of lowest-cost exterior furring systems.

MATERIALS

1. **Gypsum Board**—($\frac{1}{2}$ ") ($\frac{5}{8}$ ") thick, 48" wide Tapered Edge SHEETROCK SW, (Regular) (Insulating—foil back) Gypsum Wallboard—lengths as required.
2. **Furring Channel**—USG Metal Furring Channel.
3. **Fastener**—USG Brand Hi-Lo Screws, $\frac{7}{8}$ " or 1" Type S.
4. **Joint Treatment**—Select a U.S.G. Joint System.
5. **Metal Trim**—(choose type from Chapter 2).
6. **Corner Bead**—DUR-A-BEAD, PERF-A-BEAD or ECONO Corner Reinforcement.
7. **Adjustable Furring Accessories**
 - USG Adjustable Wall Furring Bracket.
 - $\frac{3}{4}$ " Cold Rolled Channels.
 - 16 or 18 ga. Galvanized Tie Wire.
8. **USG Control Joint No. 093.**

INSTALLATION

Furring Channel Erection—Direct Attachment

Attach Metal Furring Channels to masonry or concrete surfaces, either vertically or horizontally, spaced no more than 24" o.c. For channels positioned horizontally attach a furring channel not more than 4" from both the floor line and the ceiling line. Secure channels with fasteners occurring on alternate channel flanges and spaced 24" o.c. Use a 2" cut nail in mortar joints of brick, clay tile or concrete block or in the field of lightweight aggregate block; $\frac{5}{8}$ " concrete stub nail or power driven fasteners in monolithic concrete (see Fig A).

Attach mitered furring channels horizontally around masonry corners at window locations. To miter channels, make two 45° cuts in each wing flange of channel with a hack saw or sheet



Fig. A



Fig. B

metal snips, but do not cut into web. Bend web until cut edges of wing flanges touch each other and channel is formed in an "L" shape (see Fig. B).

Furring Channel Erection—Wall Furring Bracket

Attach USG Adjustable Wall Furring Brackets, with serrated edges faced upward, to masonry wall in following spacing pattern: 48" o.c. vertically, 6" maximum from floor and ceiling, 36" o.c. horizontally, 4" maximum from columns or other abutting construction, and as required above and below windows. Fasten each bracket through hole closest to serrated edges. Use 2" cut nails in mortar joints of brick, clay tile, cement block, or in field of lightweight aggregate blocks; use $\frac{5}{8}$ " concrete stub nails or power driven fasteners in monolithic concrete. Lay $\frac{3}{4}$ " cold-rolled channels, horizontally, on furring brackets so that channel flanges engage serrated edges of bracket. Be certain each channel is plumbed to a line with ceiling and base channels. Wire-tie cold-rolled channels to each bracket with a double strand of 16 ga. or a triple strand of 18 ga. wire. Bend each excess bracket length down and inward toward wall. Vertically position furring channels with wing flanges against cold-rolled channels and space them a maximum of 24" o.c. Wire-tie each furring channel-cold-rolled channel intersection with a double strand of 16 ga. or a triple strand of 18 ga. wire (see Fig. C).

Wallboard Erection

Apply Insulating (foil back) SHEETROCK SW Wallboard to the furring channel either horizontally or vertically and with the foil against the channels. Center and neatly fit abutting end or edge joints over furring channels with end joints staggered. Fasten with Type S drywall screws spaced 12" o.c. (see Fig. D). Use $\frac{7}{8}$ " length for $\frac{1}{2}$ " thick wallboard; 1" length for $\frac{5}{8}$ " thick board.



Fig. C



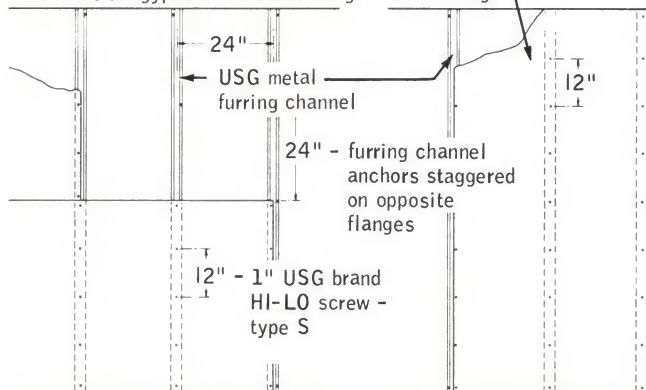
Fig. D

Finishing Furring

Apply metal trim and corner bead and treat all joints, fastener heads and trim as directed in Chapter 3.

Wall elevation

SHEETROCK gypsum wallboard--reg. or insulating

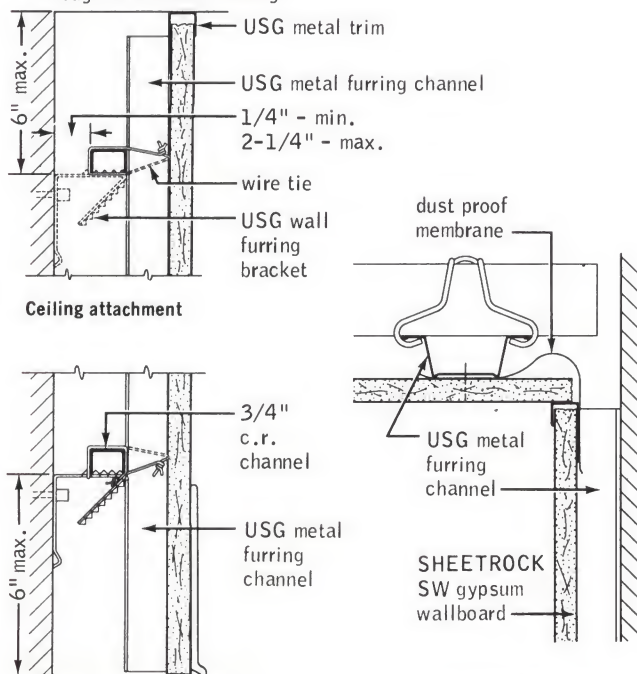


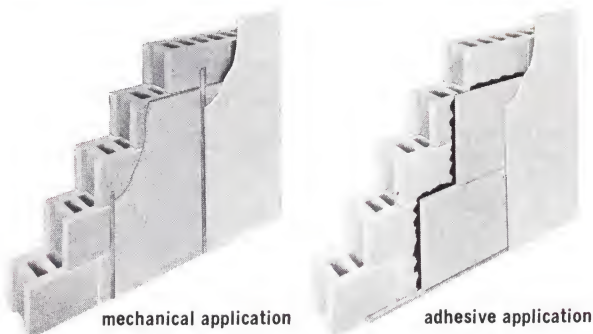
Horizontal application

Vertical application

Adjustable wall furring

rough or finished ceiling





drywall and rigid foam insulation furring

These exterior wall furring assemblies consist of $\frac{1}{2}$ " or $\frac{5}{8}$ " thick SHEETROCK SW Gypsum Wallboard and polystyrene or urethane rigid foam insulation either adhesively bonded to the wall or mechanically attached with USG Z-Furring Channels and USG Brand Screws. The USG Z-Furring Channels, suitable for $\frac{3}{4}$ " and 1" insulation, are formed from hot-dipped galvanized steel for added corrosion resistance.

The insulation is available in several thicknesses to meet most insulation and dimensional design requirements. Polystyrene rigid foams are readily attached to unit masonry and poured or pre-cast concrete with a choice of DURABOND 500 Adhesive, a latex-modified portland cement adhesive or a special insulation mastic. For urethane and wallboard application, either DURABOND 500 Adhesive or insulation mastic is used. With mechanical attachment, foam panels are applied progressively as the Z-Furring Channels are attached.

In new construction or in remodeling, the systems provide highly insulative, self-furred solid backup for SHEETROCK Wallboard. They provide a fully insulated wall at a cost competitive with many non-insulated furred walls.

ADVANTAGES

Insulation—These thin, lightweight assemblies have excellent thermal insulation values even under variable moisture conditions.

Moisture Barrier—The rigid foam has good moisture resistance properties. The drywall-foam furring system provides effective vapor resistance for the wall assembly.

Flame Retardant—Many types of rigid foam meet ASTM requirements for self-extinguishing plastics.

Economy—Low-cost materials and a minimum number of components offer simple speedy erection; combine to provide low in-place costs, permit possible structural savings. The high insulation values offer possible economies in initial and operating expenses for heating and cooling.

MATERIALS

1. **Faceboards**—($\frac{1}{2}$ " ($\frac{5}{8}$ ") thick, 48" wide SHEETROCK SW Gypsum Wallboard, in standard lengths as required.
2. **Insulation**—(STYROFOAM SM) (STYROFOAM FR) (DORVON FR-100) (THURANE) Insulation ($\frac{3}{4}$ " (1") ($1\frac{1}{2}$ ") (2") thick, as manufactured by the Dow Chemical Company.
3. **Adhesive**—(DURABOND 500 Mastic Contact Adhesive) (Insulation Mastic No. 11) (portland cement mortar modified with STYROCRETE Latex Mortar Additive), mastic and additive as manufactured by Dow Chemical Company.
4. **USG Metal Trim**—(#200-A) (#200-B) (#400) (#401) (#402).
5. **Corner Bead**—DUR-A-BEAD, PERF-A-BEAD or ECONO Reinforcement.
6. **Fasteners**— $1\frac{1}{4}$ " USG Brand Screws Type W or
— $1\frac{1}{4}$ " GWB-54 Annular Ring Nail.
7. **Joint Treatment**—Select a U.S.G. Joint System.
8. **USG Z-Furring Channel**

INSTALLATION

Installation With Z-Furring Channel

Starting at an exterior corner, position a strip of rigid foam insulation 3" max. width vertically against wall surface. Hold insulation in place with a USG Z-Furring Channel erected vertically, placed with narrow flange against wall and attached to wall with concrete stub nails or power-driven fasteners, spaced 24" o.c. max. Position next 24"-wide insulation panel so that it abuts attached furring member and hold in place with next furring channel. On wall adjacent to starting corner, position last furring channel with wide flange against wall (see page 229).

On interior corners, attach USG Z-Furring Channel with web 1" from abutting wall. Insert edge of a 12"-wide strip of foam insulation into the 1" recess formed by the wall and furring channel. Secure other edge of panel with another length of Z-Furring Channel. Attach with fasteners driven through narrow flange. Continue application with 24"-wide panels.

Installation With Adhesive

Rigid foam insulation must not be applied to masonry walls with portland cement base adhesives when outdoor temperatures during the installation may fall below 32°F. Provide and maintain a minimum temperature of 55°F. (50°F. if DURABOND 500 Adhesive is used) in the building at least 72 hours prior to, during and after, application of rigid foam insulation, gypsum wallboard and joint treatment. Provide ventilation to eliminate excessive moisture.

Generally, SHEETROCK can be bonded to rigid foam insulation 24 hours after foam installation. However, when outdoor temperatures are below 50°F. during and after application of insulation, allow 48 to 72 hours for adhesive to develop bond strength before application of the SHEETROCK gypsum wallboard. Once insulation

is applied to the wall, the wall and the adhesive are isolated from heat within the building. Therefore, a longer time is required for the adhesive to develop adequate bond strength.

If outdoor temperatures below 32°F. are anticipated or immediate wallboard application is desired, Dow Insulation Mastic No. 11 must be used as an adhesive to bond insulation to masonry. Extra mechanical attachment, described in Dow Technical Sheet No. 5-7, is recommended when temperatures are below 32°F.

Preparations

Mortar joints on surface of unit masonry to which insulation is to be bonded should be cut flush with masonry to provide an even surface. The wall surface should be plumb, true to dimensions, and clean. Old or dirty masonry must be hosed, swept and wiped down to remove loose material. Form mark protrusions must be removed from poured or precast concrete; form release agents must be removed. Pockets or holes greater than 4" in diameter and 1/8" deep must be filled with mortar.

Prior to installation, attach wood nailer strips by mechanical means to the wall surface at base and wall-ceiling junctions around window and door openings, and wherever required for subsequent attachment of moldings, trim, casings, base, cabinets, heavy drapes, or other heavy wall fixtures. These nailers may also be used to receive temporary mechanical fasteners to aid in positioning the wallboard until the adhesive has set.

Adhesive Selection

If not specified, select adhesive type and application method for appropriate surface from the table below.

adhesive and method	insulation applied to			wallboard applied to insulation
	unit masonry	formed concrete	precast concrete panels	
DURABOND 500				
• laminating spreader or notched trowel (1/4" x 1/4" min. notches). Apply uniformly on one surface, place board within 30 min.	X	X	X	X
portland cement mortar, mod. (1) (3)				
• push box to insulation, 3/16" thick layer	X	X		
Insulation Mastic No. 11 (2)				
• notched spreader to wall or insulation within 20 min.	X	X	X	
• troweled spot to wall or insulation within 20 min.—spots: 1 1/2" diam., 1" peak ht., 8" to 12" o.c.	X	X	X	
• mechanical or pneumatic adhesive applicator to insulation within 20 min., 5/16" diam. beads 3" from long edge of board	X	X	X	
• notched spreader to insulation or wallboard within 20 min.				X
• troweled spot to wallboard within 20 min.—spots: 1 1/2" diam., 1" peak ht., 12" o.c., also 2" from taped edges & 6" o.c.				X
• mechanical or pneumatic adhesive applicator to wallboard within 20 min. 4 longitudinal 5/16" diam. beads, 2" from edge, 11" o.c.				X

(1) Modify with STYROCRETE Latex Mortar Additive. (2) Not suitable for dense, non-absorbent surfaces. (3) Not suitable for rigid urethane insulation or wallboard application.



Push-box



Troweled spot

Insulation Application

Push Box—Apply $\frac{3}{16}$ " thick layer of portland cement mortar modified with STYROCRETE Latex Mortar Additive to polystyrene insulation. Install insulation within 10 minutes after adhesive is applied.

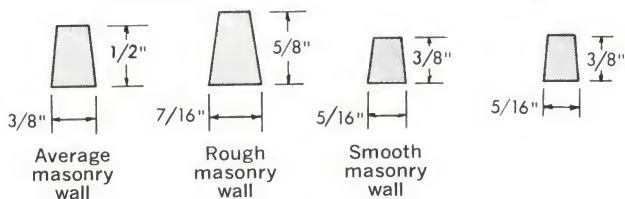
Notched Spreader—Apply Insulation Mastic No. 11 to wall using a notched hand spreader. Use a spreader with notches spaced $3\frac{1}{2}$ " o.c. and each notch to be as shown in diagram below. Install insulation within 20 minutes after adhesive is applied. Apply DURABOND 500 Adhesive in strips in center and along both edges of rigid foam panel. Use notched metal spreader having four $\frac{1}{4}$ " x $\frac{1}{4}$ " notches spaced 2" o.c. Do not apply more adhesive than can be covered in 30 minutes.

Troweled Spot—Apply Insulation Mastic No. 11 adhesive to entire surface of insulation using spots of adhesive $1\frac{1}{2}$ " in diameter, 1" high and spaced approximately 8" to 12" o.c. Install insulation within 20 minutes after adhesive is applied.

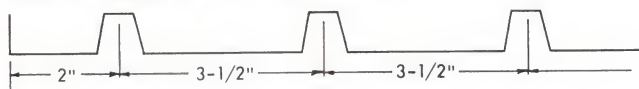
Spreader notch designs

Laminating foam to masonry

Laminating wallboard to foam



Typical notch spacing for both spreaders



Adhesive Applicator—Using a mechanical or pneumatic adhesive applicator, apply Insulation Mastic No. 11 to insulation in continuous $\frac{5}{16}$ " round beads spaced 3" in from both long edges. Install insulation within 20 minutes after adhesive is applied. For DURABOND 500, use an Ames laminating spreader having four

$\frac{1}{4}$ " \times $\frac{1}{4}$ " notches spaced 2" o.c. Apply strips at center and edges of panel. Install within 30 minutes.

Install insulation horizontally to wall surface, butt all edges tightly and stagger all vertical joints. Apply firm hand pressure over board surface to effect bond and level board as required. Slight vertical and/or lateral agitation of insulation helps in placement. For more detailed mixing and application instruction refer to Technical Data Sheets published by Dow Chemical Company, Midland, Mich.

Wallboard Application

Cut floor-to-ceiling height panels for vertical application. Allow for a continuous clearance ($\frac{1}{8}$ " to $\frac{1}{4}$ ") at the floor. A minimum of 24 hours after insulation has been installed, bond SHEETROCK SW Wallboard directly on the foam with Insulation Mastic No. 11 or DURABOND 500 Adhesive. Use either notched spreader, troweled spot or adhesive applicator method for applying adhesive.

Notched Spreader—Spread entire back surface of wallboard or wall surface of insulation with Insulation Mastic No. 11 using a notched spreader. Notches should be $\frac{3}{8}$ " high and $\frac{5}{16}$ " wide at the base, slightly tapered and spaced $3\frac{1}{2}$ " o.c. Adhesive ribbons may run in any direction convenient to application. For DURABOND 500, use a notched metal spreader ($\frac{1}{4}$ " \times $\frac{1}{4}$ " notches, 2" o.c.). Apply adhesive to center and edges of board. Install within 30 minutes.

Troweled Spot—Apply Insulation Mastic No. 11 to entire back surface of wallboard using spots of adhesive $1\frac{1}{2}$ " in diameter, 1" high and spaced 12" o.c. Also apply spots 2" from edges to be taped and spaced 6" o.c.

Adhesive Application—Using a mechanical or pneumatic adhesive applicator, apply Insulation Mastic No. 11 to back of wallboard in $\frac{5}{16}$ " round beads spaced 2" from long edges and 11" o.c. For DURABOND 500, use an Ames laminating spreader with $\frac{1}{4}$ " \times $\frac{1}{4}$ " notches 2" o.c. Apply adhesive in strips at center and edges of board.

After adhesive is applied, place SHEETROCK Gypsum Wallboard with long (tapered) edges vertically against the insulation, apply firm hand pressure over board surface to effect bond and level board. Use slight vertical and/or lateral agitation to help in placement. After adhesive application, place SHEETROCK Wallboard on insulation *within 20 min.; 30 min. for DURABOND 500*. If panel touches floor, cut it back to provide $\frac{1}{8}$ " min. clearance.

Install control joints in the wallboard finish (USG Metal Trim back-to-back), coinciding with control joints in exterior wall.

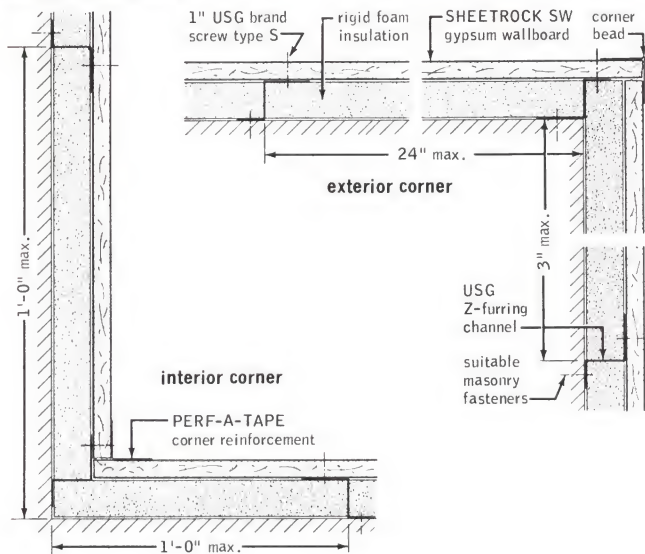
Finishing

After adhesive is well set (minimum of 24 hours), forming a firm bond between the SHEETROCK Wallboard and insulation, finish SHEETROCK in conventional manner, taking care not to severely shock the surface by impact for at least 72 hours.

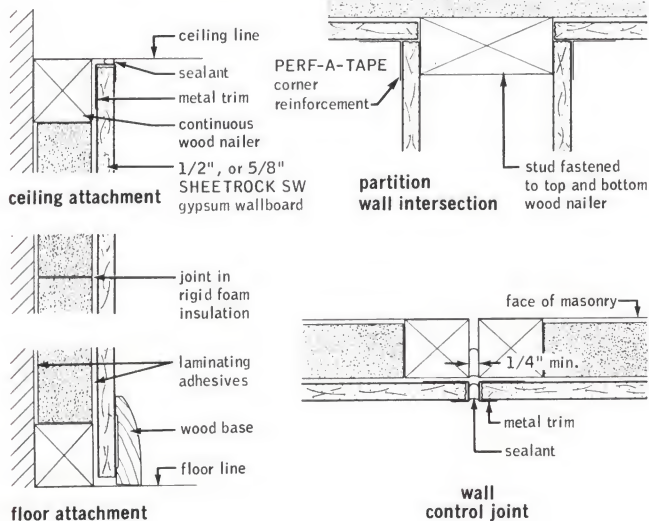
Apply metal trim and corner bead and treat all joints, fastener heads and trim as directed in Chapter 3. Apply reinforcing tape the full length of joint.

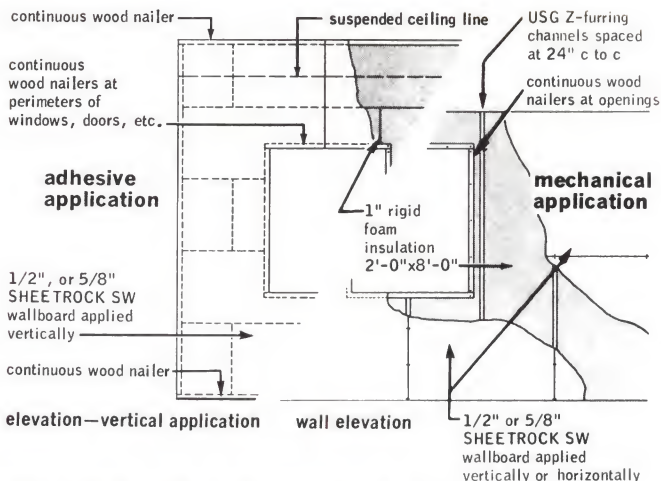
mechanical application details

wall plan sections

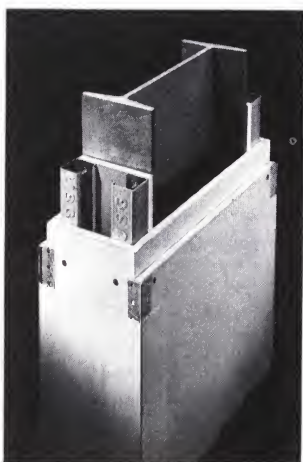
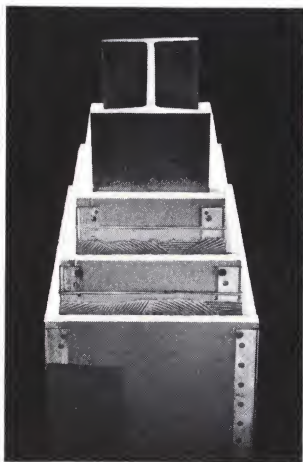


adhesive application details





column fire protection



Steel column fire protection with SHEETROCK FIRECODE Wallboard offers lightweight, thin, compact fire protection of two, three or four hours depending upon the construction. The wallboard is held in place by a combination of wire, screws, metal studs and corner bead and joint compound.

FIRE RATED CONSTRUCTION

2-Hour Rating—(Des. 10—2 hrs) 2 layers 1/2" FIRECODE "C" Wallboard applied vertically around column; base layers attached to No. 158 USG Metal Studs with 1" Type S screws 24" o.c.; double layer face panel attached to web of stud with 1 5/8" Type S screws; face layer screws 12" o.c. and staggered from screws in base layer; metal corner bead at all corners; joints finished.

(Des. 23—2 hrs) Single layer $\frac{1}{2}$ " SHEETROCK FIRECODE "C" Wallboard applied vertically over No. 158 USG Metal Studs with 1" Type S screws spaced 12" o.c.; metal corner bead, joints finished. Limitation: 14 wf 228 column only.

3-Hour Rating—(Des. 14—3 hrs) 3 layers $\frac{5}{8}$ " SHEETROCK FIRECODE Wallboard vertically around column; base and 2nd layers attached by DUR-A-BEAD and horizontally applied double strand 18 ga. tie wire; 2nd and 3rd layers laminated and screw-attached to corner beads; metal corner bead at all corners; joints finished.

4-Hour Rating—(Des. 34—4 hrs and 31—4 hrs) 2" solid or 3" hollow PYROBAR Gypsum Tile around column; galvanized steel bands 24" from each end and 48" o.c.; continuous metal angles attached to bands with $\frac{3}{8}$ " Type S pan head screws; $\frac{5}{8}$ " SHEETROCK FIRECODE Wallboard attached to angles with 1" Type S screws 8" o.c.; metal corner bead at all corners; joints finished.

(Des. 48—4 hrs) 2 layers $\frac{1}{2}$ " SHEETROCK FIRECODE "C" Wallboard applied vertically over No. 158 USG Metal Studs with 1" and $1\frac{5}{8}$ " Type S screws spaced 12" o.c.; metal corner beads finished with joint compound. Limitation: 14 wf 228 column only.

ADVANTAGES

Fire Resistance—up to 4 hours.

Lightweight—These thin lightweight assemblies add minimum dead load and save floor area.

Economy—Quickly and easily installed without waiting for adhesive to dry. Systems use a minimum number of low-cost components.

MATERIALS

- 1. Gypsum Board**— $\frac{5}{8}$ " thick, 48" wide Tapered Edge SHEETROCK FIRECODE; $\frac{1}{2}$ " FIRECODE "C" Wallboard—lengths as required.
- 2. Adhesive**—PERF-A-TAPE Joint Compound-Taping.
- 3. Joint Treatment**—Select a U.S.G. Joint System.
- 4. Fasteners**—USG Brand Screws—1" Hi-Lo Type S, $1\frac{5}{8}$ " Hi-Lo Type S, $\frac{3}{8}$ " Type S pan head.
- 5. Corner Bead**—103 DUR-A-BEAD or ECONO Metal Corner Reinforcement.
- 6. Tie Wire**—18 ga. Galvanized Tie Wire.
- 7. USG Metal Studs**—No. 158 ($1\frac{5}{8}$ ").
- 8. PYROBAR Gypsum Partition Tile** (2" Solid) (3" Hollow).
- 9. RED TOP Partition Tile Cement.**
- 10.** Clean, sharp sand complying with ASTM C35 (not available from U.S.G.)
- 11.** USG $1\frac{3}{8}$ "x $7\frac{7}{8}$ "x24 ga. Galvanized Metal Angles.
- 12.** 2"x26 ga. galv. steel straps (not available from U.S.G.).

INSTALLATION

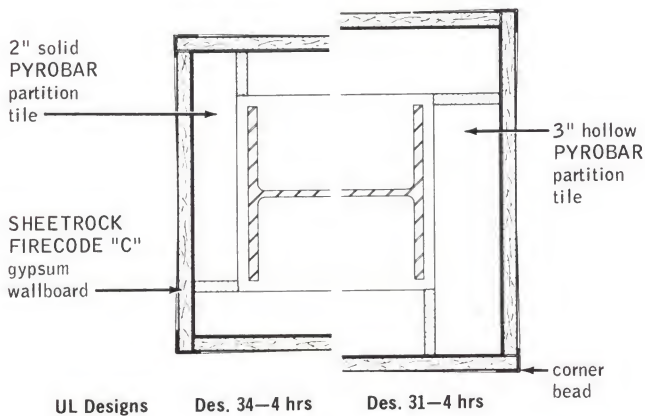
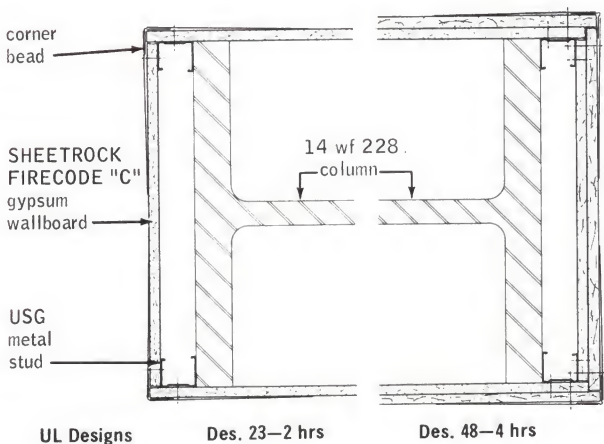
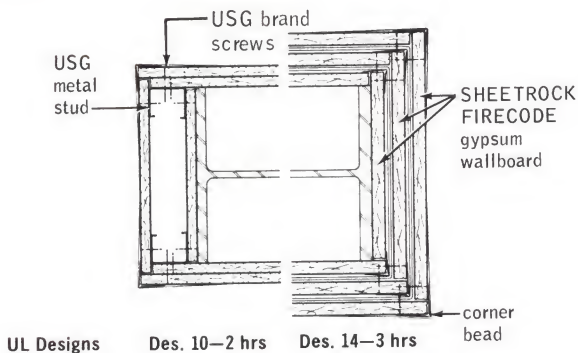
2-Hour Rating—Attach $\frac{1}{2}$ " FIRECODE "C" inner layer to No. 158 Metal Studs with 1" Type S screws spaced 24" o.c. Place assembly with wallboard adjacent to column flange. Erect another wallboard layer vertically around column. Attach base layer panels to studs with 1" Type S drywall screws 24" o.c.; face layer panels 12" o.c. Apply second wallboard layer to web face side of column and attach through first wallboard layer to web of studs with $1\frac{5}{8}$ " Type S screws 12" o.c. and staggered from screws in first layer. Screw-attach ECONO Corner Bead vertically at all corners and finish over trim with joint compound as described in Chapter 3.

3-Hour Rating—Erect $\frac{5}{8}$ " SHEETROCK FIRECODE Wallboard inner layer vertically, apply DUR-A-BEAD reinforcement vertically at each corner and wire-tie in place with a double strand of 18 ga. tie wire around column. Place wires 6" from slab construction and no more than 21" o.c. Apply PERF-A-TAPE Joint Compound-Taping to inner layer and erect wallboard center layer in same manner as inner layer. Fasten DUR-A-BEAD with 1" Type S screws 12" o.c. Apply adhesive to center layer and erect face layer vertically; apply corner bead vertically at all corners and fasten with 1" Type S screws 12" o.c. Finish over trim with joint compound as directed in Chapter 3.

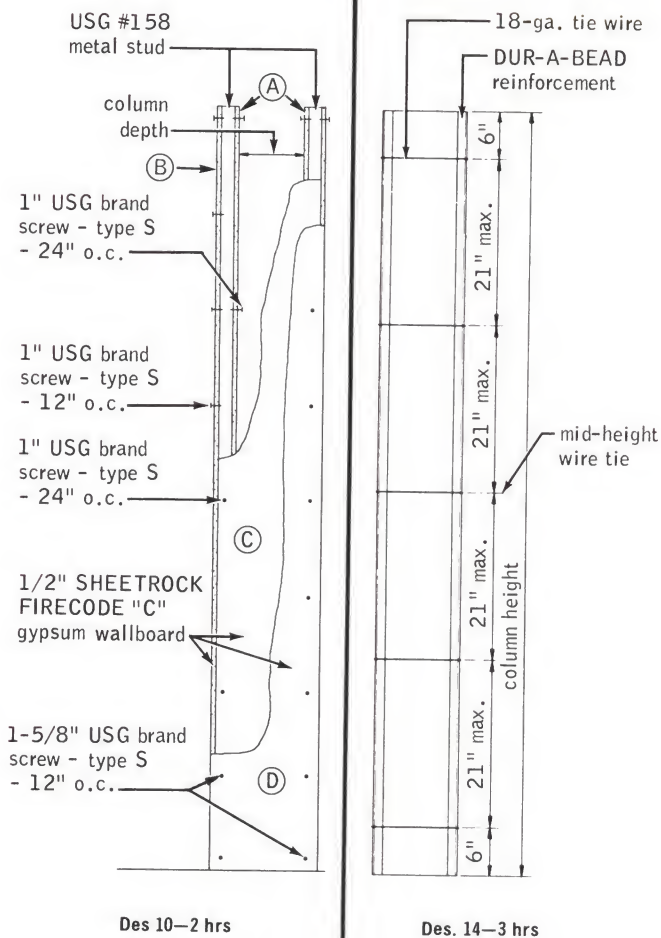
4-Hour Rating—Lay PYROBAR Gypsum Tile plumb and true around columns using mortar mixed in proportions of 1 part Partition Tile Cement to 3 parts sand, by weight. Do not retemper mortar. After rough plumbing and wiring is in, place the first course with core holes horizontal by bedding mortar to a true and straight line. Set tile to provide $\frac{1}{2}$ " minimum clearance from the edges and faces of all columns. Lay succeeding courses in $\frac{1}{2}$ " thick full mortar bed uniformly level in each course. Stagger vertical joints and interlock tile at corners. Cut all joints flush. Use no broken tile. Slush chinks and crevices full with mortar. Cut top tile obliquely and wedge in place at ceiling. Slush joints between tile and ceiling full with mortar. Do not chase out PYROBAR for conduit or other piping. Seal exposed core holes with at least 2" of mortar.

Install perimeter straps of 2"x26 ga. galvanized steel horizontally around PYROBAR Tile no more than 24" from floor and ceiling and not to exceed 48" o.c. Secure strap ends with $\frac{3}{8}$ " Type S pan head screws. Place $1\frac{3}{8}$ "x $\frac{7}{8}$ "x24-ga. galvanized metal angles cut to $\frac{1}{2}$ " less than floor-to-ceiling height over the perimeter straps at each corner and secure to each perimeter strap with $\frac{3}{8}$ " Type S pan head screws driven in each angle flange. Install $\frac{5}{8}$ " SHEETROCK FIRECODE "C" Wallboard over and secure to corner angles with 1" Type S screws spaced 8" o.c. Finish over trim with joint compound as directed in Chapter 3.

Plan sections



Column elevations

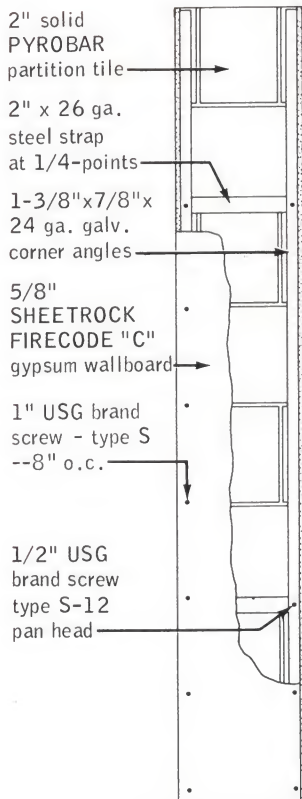


Des. 10—2 hrs: As shown

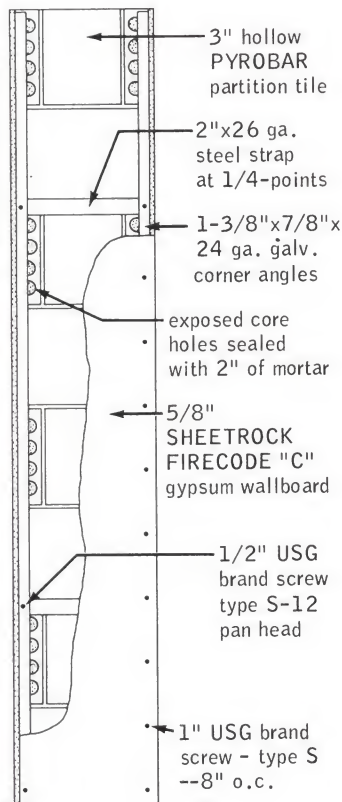
Des. 23—2 hrs: Omit layers
A and D

Des. 48—4 hrs: Omit layers
A, add D on
all sides

Column elevations



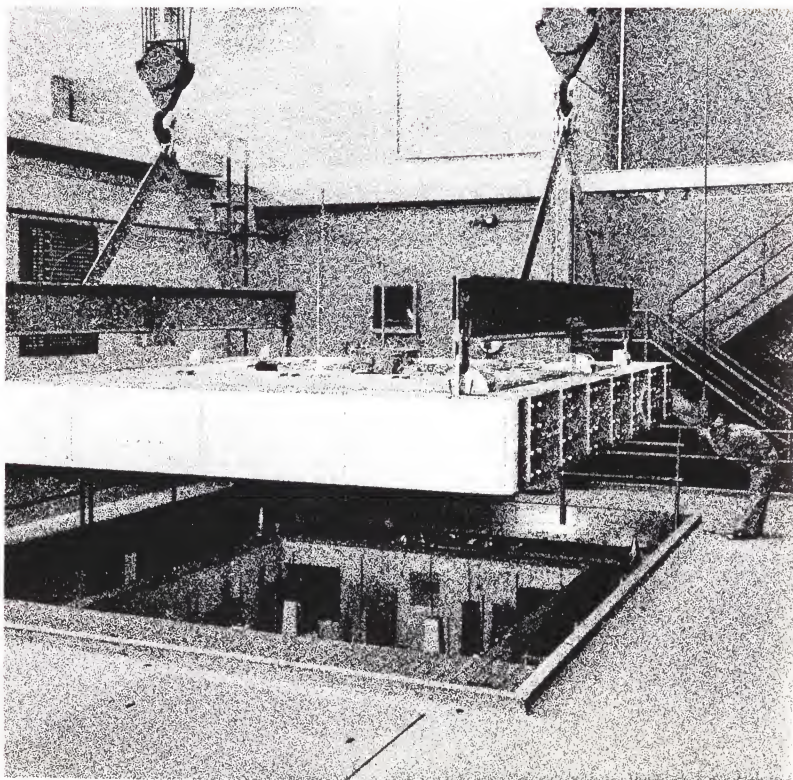
4-hour—solid tile



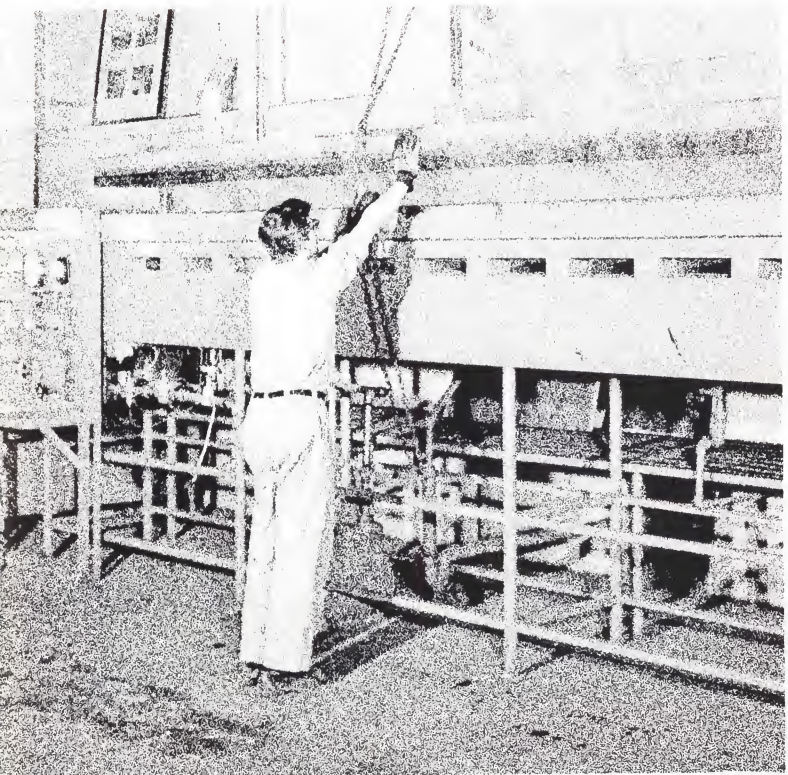
4-hour—hollow tile

chapter 5

fire and sound test data



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fire and sound tests

Laboratory test data are used to compare, specify and select materials and constructions, and frequently to secure code or agency acceptance. Fire and sound ratings are assigned on the basis of performance shown in standard laboratory testing procedures. Laboratory data are often validated by subsequent field tests. Fire and sound ratings are important in evaluating and qualifying gypsum drywall partitions, floor-ceiling assemblies, and column fireproofing enclosures.

A **fire resistance rating** denotes the length of time a given assembly can resist passage of intense heat and flames while supporting the imposed design loads. *Fire ratings are correlated with all components of a given assembly—not with the ceiling or partition membrane alone.*

The fire tests referred to in the following tables for 2" nominal width wood joists and studs are based on an actual width of 1 $\frac{5}{8}$ " rather than the 1 $\frac{1}{2}$ " "dry" lumber marketed by several large manufacturers.

The **Sound Transmission Class (STC)** rating has become the most widely accepted means of indicating a partition's sound resistance—the result of comparing the sound transmission loss of a tested assembly with a "standard contour" of known sound loss performance.

Tests conducted using 11 frequencies (ASTM E90-61T) or 16 frequencies (E90-66T) are matched to standard contours known as STC curves. This procedure brings tests made with either designation into a comparative ratio.

Where STC ratings are not available, "db" (decibel) transmission loss averages are used resulting from sound tests conducted at 9 or 11 frequencies within a range of 125 to 4,000 cycles per second.

Impact Noise Rating (INR) designates the ability of a floor-ceiling construction to resist impact sound transmission. INR is measured on a plus or minus scale in relation to a standard performance curve INR=0. The higher the positive number the better the assembly resists impact sound transmission.

Impact Insulation Class (IIC) is a revision in reporting a *single number* rating, and a slight change in testing procedure. Test equipment remains the same. Test data will be recorded at one-third octave bands, and the criteria curve is slightly changed. A rule of thumb which can be used is to add 51 to current INR ratings. The IIC single-number rating eliminates confusion of the plus and minus number ratings.

United States Gypsum leads the industry in documentation of the performance of its drywall systems by recognized testing laboratories—fire ratings ranging up to 2 hours for partitions, three hours for ceilings, 4 hours for column fireproofing; STC values as high as 60. In the test listings on the following pages, laboratories are identified at the end of each description as part

of the pertinent test references. They are noted by abbreviation as follows:

BMS and NBS—National Bureau of Standards
 UL—Underwriters' Laboratories, Inc.
 OSU—Ohio State University
 U of C—University of California
 TL—Riverbank Acoustical Laboratories
 G&H—Geiger & Hamme Laboratory
 CK—Cedar Knolls Acoustical Laboratories

In comparing any two sets of test data, one must be certain they were obtained under circumstances and by test procedures that were identical or nearly identical. Particularly in the case of acoustical laboratories, test methods are subject to change. This can necessitate the use of a correction factor for tests conducted before or after a certain date.

The Selector Guides below classify tested USG partition assemblies according to their fire and sound ratings and types of construction. The numerals in each column correspond to the "assembly numbers" listed in sequence starting on page 242. Rated ceiling assemblies and column and beam fireproofing systems also are included in the tables.

selector guide—sound-rated partitions

	Wood Stud	Metal Stud	Laminated Gypsum	Movable Gypsum
55-60 STC	1, 2	13, 18	24, 26	
50-54 STC	4, 5, 6, 8	15, 16, 19	25, 30	
45-49 STC	7	17, 20, 21	27	38, 40, 41
40-44 STC	12	22	33	39
UNDER 40 STC	9, 10, 11	23	28, 36	

selector guide—fire-rated partitions

	Wood Stud	Metal Stud	Laminated Gypsum	Movable Gypsum
3 hrs.			35	
2 hrs.	1, 2, 3	13, 14, 15, 16, 17, 18	24, 25, 26, 27, 28, 29, 30, 31, 36	
1½ hrs.			32	
1 hr.	4, 5, 6, 7, 8, 9, 10, 11	19, 20, 21, 22, 23	33, 34, 37	38, 41
45 min.	12			

FHA standards

The Federal Housing Administration and leading mortgage and investment companies now include acoustic control standards for partitions in their mortgage commitments. FHA Standards are shown below.

Partitions Sound Transmission Limitations

Location of Partition	Sound Transmission Class (STC) (1)			
	Land-Use Intensity less than 6.0 (2) (low background noise)		Land-Use Intensity 6.0 or higher (3) (high background noise)	
	Bedroom adjacent to partition (4)	Other rooms adjacent to partition	Bedrooms adjacent to partition (4)	Other rooms adjacent to partition
Living Unit to Living Unit (5)	Class 50	Class 45	Class 45	Class 40
Living Unit to Corridor (6)	Class 45	Class 40	Class 45	Class 40
Living Unit to Public Space (average noise) (7)	Class 55	Class 50	Class 50	Class 45
Living Unit to Public Space and Service Areas (high noise) (8)	Class 60	Class 55	Class 55	Class 45
Bedrooms to other rooms within same Living Unit (9)	Class 45	NA	Class 40	NA

Floors and Ceilings Sound Transmission Limitations

Location of Floor	Airborne Sound Transmission Class (STC) (1)		Impact Insulation Class (IIC) (2)	
	Land-Use Intensity less than 6.0 (3)	Land-Use Intensity 6.0 or higher (4)	Land-Use Intensity less than 6.0 (3)	Land-Use Intensity 6.0 or higher (4)
Floors Separating Living Units	Class 50	Class 45	IIC 51	IIC 49
Corridor Floors above Living Units	Class 55	Class 50	IIC 56	IIC 53
Living Unit Floors above Public Space or Service Areas (5)	Class 50 (6)	Class 45 (6)	IIC 46	IIC 43
Public Space or Service Areas above Living Units (7)	Class 55 (6)	Class 50 (6)	IIC 56	IIC 56
Service Areas on Same Floor as Living Units	NA	NA	See note (8)	See note (8)

NOTES, PARTITION TABLE:

- (1) Sound Transmission Class as determined by ASTM E90-61T.
- (2) See FHA Minimum Property Standards M301 for Land-Use Intensity.
- (3) Living units in buildings having year-round air-conditioning and in living units above the eighth floor, use columns for Land-Use Intensity less than 6.0.
- (4) Where bedrooms are separated from corridor or from adjacent living units with closets or storage walls, the effect of such noise attenuation may be considered in partition sound transmission.
- (5) In high-rental apartments where an extreme tenant sensitivity to noise is expected, an increase of 5 db over values shown is recommended.
- (6) These values assume floors in corridors are carpeted; otherwise increase 5 db. See M505-6 for corridor doors.
- (7) Public space of average noise include lobbies, laundries, storage rooms, stairways, etc.
- (8) Areas of high noise include boiler rooms, mechanical equipment rooms, elevator shafts, incinerator shafts, garages and most commercial uses.
- (9) Acoustic separation of bedrooms within living units is desirable, but not required.

NOTES, FLOORS AND CEILINGS TABLE:

- (1) Sound Transmission Class as determined by ASTM E90-61T.
- (2) Impact Insulation Class as determined by FHA recommended impact noise criteria set forth in the U.S. Department of Housing and Urban Development "Airborne, Impact, and Structure-Borne Noise Control in Multifamily Dwellings". Values for impact noise control (except isolation of equipment noises) are recommended, but not required.
- (3) See FHA Minimum Property Standards M301 for Land-Use Intensity.
- (4) Living units in buildings above the eighth floor, use column for Land-Use Intensity less than 6.0.
- (5) Limitations do not apply to floors over storage rooms and similar spaces not containing mechanical equipment or where noise from living units would not be objectionable.
- (6) Increase 5 db when over or under boiler rooms, generators or other mechanical equipment which operate at high noise levels.
- (7) Public space or service areas above living units is not recommended. Where such use is unavoidable, special acoustical analysis, control and isolation of equipment may be required.
- (8) Where service areas are on same floor as living units, mechanical equipment shall be effectively isolated from floor.

upgrading partition performance

Usually the architect only selects a partition system which has been tested and achieved a high "STC" rating in the laboratory, and prepares corresponding details and specifications for the partition contractor. Unfortunately, the acoustical performance indicated by test can be lost between the architect's drawing board and the completed partition. This has been true in many projects.

U.S.G. research work has proven that a partition can be built in three different ways on-the-job, and that each produces a different acoustical value. They can be defined as:

- (1) *Normal*: both the building structure and party walls are designed and built without considering acoustical performance.
- (2) *Select*: the structure is, again, designed and built normally. But partitions are selected and built according to acoustical details used in the laboratory when the assembly was tested.
- (3) *Pre-design*: the building structure is designed and constructed with special acoustical details to prevent sounds from flanking a partition. Most important of these details are provisions for proper perimeter relief, and caulking of openings and perimeter points.

The caulking used should be the resilient, non-hardening, non-skinning type to maintain a partition's sound resistance and to seal against sound leaks. Gasketing alone is not as effective.

See Chapter 3 for proper caulking procedures. Isolation of adjoining surfaces is required to prevent direct transmission of sound energy. For details, see Chapter 1.

wood stud partitions

Assembly No.	Description & Test References	Fire Rating	STC Rating
1	2 layers 1/2" SHEETROCK FIRECODE "C" gypsum wallboard each side—2x4 16" o.c.—3" THERMAFIBER ins wool blankets—RC-1 channel one side spaced 24" o.c.—wallboard screw att—opp side nail att—both base layers applied vertically and face layers appl horiz—base layers perim caulked—joints fin—wt 12—width 6 1/8"—TL-67-239(s)—TL-67-212(s)	2 hrs. (est)	59 49
2	Same as 1 except 5/8" SHEETROCK FIRECODE "C" wallboard—wt 13—width 6 3/8"—T-4799-OSU(f)—TL-67-239(s)	2 hrs.	59 (est)
3	2 layers 5/8" SHEETROCK FIRECODE or W/R FIRECODE "C" gypsum wallboard each side—2x4 16" o.c.—base layer att with 6d c.c. nails 6" o.c.—face layer lamin—joints fin—wt 13—width 6 1/8"—UL Des 4-2 hr (f)	2 hrs.	—
4	5/8" SHEETROCK FIRECODE or W/R FIRECODE "C" gypsum wallboard—2 rows 2x3 stag studs on separate plates 1" apart—2 layers each side—base layer 1/2" USG wood fiber sound deadening bd att with 6d c.c. nails—face layer att with 7d c.c. nails—joints fin—perimeter caulked—wt 9—width 8 1/2"—UL Des 17-1 hr (f)—USG-46-FT-G&H (s)	1 hr.	53
5	5/8" SHEETROCK FIRECODE gypsum wallboard—2x4 16" o.c.—2 layers each side—base layer 1/2" USG wood fiber sound deadening bd att with 5d c.c. nails—face layer SHEETROCK strip lamin—joints fin—perimeter caulked—wt 8—width 5 3/8"—IBI-20-FT-G&H (s)	1 hr. (est)	50
6	Resil 5/8" SHEETROCK FIRECODE "C" gypsum wallboard—2x4 16" o.c.—3" THERMAFIBER ins wool blankets between studs—RC-1 channel one side spaced 24" o.c.—wallboard att with 1" Type S screws—opp side direct att with 1 1/4" Type W screws—joints fin—perimeter caulked—wt 7—width 5 3/8"—UL Des 27-1 hr (f)—USG-33-FT-G&H (s)	1 hr.	52

Notes: (1) Tested at 16 frequencies. (2) Job test results. Abbreviations: att—attached; atten—attenuation; bd—board; c.c.—cement coated; cr—cold rolled; db—decibel; Des—Design; f—fire; fin—finished; fl—floor; horiz—horizontally; INR—Impact Noise Rating; ins—insulating; lamin—laminated; opp—opposite; resil—resilient; s—sound; stag—staggered; spec—special; STC—Sound Transmission Class; wt—weight.

Assembly No.	Description & Test References	Fire Rating	STC Rating
7	Resil $\frac{5}{8}$ " SHEETROCK FIRECODE gypsum wallboard—2x4 16" o.c.—RC-1 channel both sides spaced horiz 24" o.c. att with 6d nails—wallboard att with 1" Type S screws—joints fin—perimeter caulked—wt 7—width $5\frac{7}{8}$ "—T-1396-OSU (f)—TL-60-52 (s)	1 hr.	45
8	$\frac{5}{8}$ " SHEETROCK FIRECODE gypsum wallboard—2 rows 2x3 stag studs 16" o.c. on separate 2x3 plates 1" apart—2" THERMAFIBER ins wool blankets one side—wallboard att with 1 $\frac{1}{4}$ " Type W screws 16" o.c.—joints fin—perimeter caulked—wt 8—width $7\frac{1}{2}$ "—USG-106-FT-G & H (s)—USG-155-FT-G&H (s)	1 hr. (est)	51 49
9	2 layers $\frac{3}{8}$ " SHEETROCK gypsum wallboard lamin and nailed—2x4 16" o.c.—joints fin—wt 7—width $5\frac{1}{8}$ "—T-118-48-48A-OSU (f)—TL-57-14 (s)	1 hr.	38
10	$\frac{5}{8}$ " SHEETROCK FIRECODE gypsum wallboard—2x4 16" o.c.—2" THERMAFIBER ins wool blankets—wallboard screw att with 1 $\frac{1}{4}$ " Type W screws 16" o.c.—joints fin—perimeter caulked—wt 7—width $4\frac{7}{8}$ "—USG-105-FT-G&H (s)	1 hr. (est)	35
11	$\frac{5}{8}$ " SHEETROCK FIRECODE or W/R FIRECODE "C" gypsum wallboard—2x4 16" o.c.—wallboard att with 1 $\frac{7}{8}$ " c.c. nails 7" o.c.—joints exposed or fin—perimeter caulked—wt 7—width $4\frac{7}{8}$ "—UL Des 5-1 hr (f)—USG-30-FT-G&H (s)	1 hr.	34
12	$\frac{1}{2}$ " SHEETROCK gypsum wallboard—2x4 16" o.c.—base layer $\frac{1}{2}$ " USG sound deadening board att with 1 $\frac{3}{8}$ " c.c. nails 12" o.c.—wallboard face layer strip lamin and 2 $\frac{1}{4}$ " c.c. nails 24" o.c. into studs—wt 7—width $5\frac{5}{8}$ "—IBI-5-FT-G&H (s)	45 min. (est)	42

metal stud partitions

Assembly No.	Description & Test References	Fire Rating	STC Rating
13	2 layers $\frac{5}{8}$ " SHEETROCK FIRECODE "C" gypsum wallboard each side—3 $\frac{3}{8}$ " USG studs 24" o.c.—1 $\frac{1}{2}$ " THERMAFIBER sound atten blankets—base layer screw att—face layer lamin—joints fin—perimeter caulked—wt 12—width $6\frac{1}{8}$ "—USG-109-FT-G&H (s)—KSO-109006-a (s)	2 hrs. (est)	53 55(2) 54(1)(2)

Assembly No.	Description & Test References	Fire Rating	STC Rating
14	2 layers 1/2" SHEETROCK FIRECODE "C" gypsum wallboard—1 5/8" USG studs 24" o.c.—2 layers each side applied vertically and screw att—joints fin—wt 9—width 3 5/8"—U of C 6-15-65 (f)	2 hrs.	N/A
15	2 layers 1/2" SHEETROCK FIRECODE "C" gypsum wallboard each side—2 1/2" or 3 5/8" USG studs 24" o.c.—1", 1 1/2" or 2" THERMAFIBER sound atten blankets between studs—wallboard applied vertically and joints stag—base layer screw att—face layer strip lamin, Type G screws between studs—joints fin—perimeter caulked—wt 10—width 4 1/2"—UL Des 28-2 hr (f)—USG-114-FT-G&H (s)	2 hrs.	54
16	5/8" SHEETROCK FIRECODE wallboard—2 layer—3 5/8" USG studs 24" o.c.—base layer 1/2" USG mineral fiber sound deadening board each side screw att—wallboard face layer lamin and screw att—joints stag and fin—perimeter caulked—wt 8—width 5 7/8"—USG-103-FT-G&H (s)—KSO-109006-b (s)	2 hrs. (est)	50(2) 52 52(1)
17	2 layers 5/8" SHEETROCK FIRECODE gypsum wallboard plain or vinyl faced applied vertically each side—2 1/2" or 3 5/8" USG studs 24" o.c.—base layer screw att—face layer lamin or screw att—joints fin or unfin—perimeter caulked—wt 12—width 6 1/8"—UL Des 11-2 hr (f)—TL-60-113 (s)	2 hrs.	46
18	Metal stud chasewall—2 layers 1/2" SHEETROCK FIRECODE "C" gypsum wallboard each side—1 5/8" USG studs 24" o.c. in two rows spaced 6 3/4" apart—1/2" wallboard gussets spanning chase att at quarter points—1 1/2" THERMAFIBER sound atten blankets one side—wallboard applied vertically and screw att—joints stag and fin—perimeter caulked—wt 11—width 12"—USG-134-FT-G&H (s)	2 hrs. (est)	55
19	1/2" SHEETROCK FIRECODE "C" gypsum wallboard 3 5/8" USG studs 24" o.c.—single layer wallboard one side applied vertically and screw att—1" THERMAFIBER sound atten blankets one side—2 layers wallboard opp side applied vertically and screw att—joints stag and fin—perimeter caulked—wt 7—width 5 1/8"—TL-65-252 (s)	1 hr. (est)	51(1)

Assembly No.	Description & Test References	Fire Rating	STC Rating
20	1/2" SHEETROCK FIRECODE "C" gypsum wallboard—2 1/2" USG studs 24" o.c.—1 1/2" THERMAFIBER sound atten blankets one side—single layer wallboard each side applied vertically and screw att—joints fin—perimeter caulked—wt 5—width 4 5/8"—T-3362-OSU (f)—TL-65-158 (s)	1 hr.	48(1)
21	1/2" SHEETROCK FIRECODE "C" gypsum wallboard applied vertically over 1/2" USG mineral fiber sound deadening board—1 5/8" USG studs 24" o.c.—base layer applied vertically and screw att—face layer strip lamin and screw att—joints stag and fin—perimeter caulked—wt 7—width 3 5/8"—UL Des 23-1 hr (f)—USG-57-FT-G&H (s)	1 hr.	48
22	5/8" SHEETROCK FIRECODE gypsum wallboard—3 5/8" USG studs 24" o.c.—single layer wallboard applied vert or horiz and screw att 12" o.c.—joints fin—perimeter caulked—wt 6—width 4 7/8"—T-1174-OSU (f)—GA-WP-45-1 hr (f)—USG-17-FT-G&H (s)	1 hr.	42
23	5/8" SHEETROCK FIRECODE gypsum wallboard—1 5/8" USG studs 24" o.c.—single layer wallboard applied vertically and screw att 12" o.c.—joints fin—perimeter caulked—wt 5—width 2 7/8"—U of C 7-31-62 (f)—TL-64-29 (s)	1 hr.	38

laminated gypsum partitions

Assembly No.	Description & Test References	Fire Rating	STC Rating
24	Triple Solid—1/2" SHEETROCK gypsum wallboard—3 rows of 1" USG gypsum coreboard each spaced min 1 1/8" and 1 1/2" apart—1 1/2" THERMAFIBER sound atten blankets att to back of one outer row—wallboard lamin and screw att to outer rows—steel runners—joints fin—perimeter caulked—wt 17—width 6 1/4"—USG-94-FT-G&H (s)	2 hrs. (est)	59
25	Triple Solid—same as No. 24 except rows spaced 1 1/8" apart and without wool—wt 17—width 6 1/4"—USG-95-FT-G&H (s)	2 hrs. (est)	53

Assembly No.	Description & Test References	Fire Rating	STC Rating
26	Double Solid— $\frac{1}{2}$ " SHEETROCK gypsum wallboard lamin each face to 2 rows 1" USG gypsum coreboard spaced 3" apart — $\frac{1}{2}$ " THERMAFIBER sound atten blankets stapled to back of one row—steel runners—joints fin—perimeter caulked —wt 13—width 6"—UL Des 26-2 hr (f) —USG-96-FT-G&H(s)—KSO-109006-c(s)	2 hrs.	60 56(2) 55(1)
27	Double Solid—same as No. 26 except rows spaced $1\frac{1}{8}$ " apart and without wool —wt 13—width $4\frac{1}{8}$ "—T-1310-OSU (f) —USG-13-FT-G&H (s)	2 hrs.	46
28	Solid— $\frac{5}{8}$ " SHEETROCK FIRECODE gypsum wallboard face layers each side over 1" USG gypsum coreboard—face layers lamin—joints stag and fin—wt 9—width $2\frac{1}{4}$ "—TL-59-98 (s)	2 hrs. (est)	34
29	Solid Vent Shaft— $\frac{5}{8}$ " SHEETROCK FIRECODE gypsum wallboard faces each side over 1" USG gypsum coreboard—face layers lamin and screw att—joints stag and unfin— $\frac{7}{8}$ " x $1\frac{1}{8}$ " angle runners horiz at floor, ceiling and quarter points —wt 9—width $2\frac{1}{4}$ "—UL Des 21-2 hr (f)	2 hrs.	N/A
30	418 Gypsum Ribwall—2 layers $\frac{5}{8}$ " SHEETROCK FIRECODE gypsum wallboard each side—1"x6" gypsum ribs 24" o.c. lamin between base layers—wallboard screw att—joints fin—wt 12—width $4\frac{1}{8}$ " —UL Des 17-2 hr (f) TL-63-15 (s)	2 hrs.	51
31	$\frac{1}{2}$ " SHEETROCK FIRECODE "C" gypsum wallboard faces each side over 1" USG gypsum coreboard—face layers lamin—joints stag and fin— $\frac{7}{8}$ " x $1\frac{1}{8}$ " angle runners at flr— $\frac{1}{2}$ " met trim at sidewall/ceiling—wt 8—width 2"—T-1339-OSU (f)	2 hrs.	N/A
32	Solid— $\frac{1}{2}$ " SHEETROCK gypsum wallboard faces each side over 1" USG gypsum coreboard—face layers lamin—joints stag and fin—1" sq wood runner—wt 8 —width 2"—T-1175-OSU (f)	$1\frac{1}{2}$ hrs.	N/A
33	368 Gypsum Ribwall— $\frac{5}{8}$ " SHEETROCK FIRECODE gypsum wallboard— $1\frac{1}{8}$ " x 6" gypsum ribs 24" o.c. lamin between single layer wallboard each side—wallboard screw att at joints—joints fin—wt 8—width $3\frac{3}{4}$ "—TL-62-285 (s)	1 hr. (est)	43
34	278 Gypsum Studwall— $\frac{5}{8}$ " SHEETROCK FIRECODE gypsum wallboard— $1\frac{1}{8}$ " x 6" lamin gypsum studs 24" o.c.—wallboard screw att both sides 18" o.c.—joints fin —wt 7—width $2\frac{7}{8}$ "—UL Des 16-1 hr (f)	1 hr.	N/A

Assembly No.	Description & Test References	Fire Rating	STC Rating
35	Shaft Wall Gypsum Drywall—2 layers $\frac{5}{8}$ " SHEETROCK gypsum wallboard applied vertically one side over 2" USG lamin coreboard set in metal J-runners—metal H-studs 24" o.c.—horiz USG metal furring channel betw wallboard layers—both layers screw att—joints fin—wt 14—width $4\frac{1}{8}$ "—T-4423-OSU (f)	3 hrs.	N/A
36	Shaft Wall Gypsum Drywall—2 layers $\frac{1}{2}$ " SHEETROCK gypsum wallboard applied vertically one side over 2" USG lamin gypsum coreboard set in metal J-runners—metal H-studs 24" o.c.—base layer screw att—face layer lamin and screw att—joints fin—wt 14—width 3"—T-4481-OSU (f)—TL-68-78 (s)	2 hrs.	38
37	Shaft Wall Gypsum Drywall— $\frac{5}{8}$ " SHEETROCK gypsum wallboard one side over 2" USG lamin coreboard set in metal J-runners—metal H-studs 24" o.c.—wallboard applied vertically and screw att—joints fin—wt 12—width $2\frac{5}{8}$ "—T-4422-OSU (f)	1 hr.	N/A

movable partitions

Assembly No.	Description & Test References	Fire Rating	STC Rating
38	Movable Demountable Partition— $\frac{1}{2}$ " vinyl-faced SHEETROCK FIRECODE "C" gypsum wallboard and battens screw att— $2\frac{1}{2}$ " USG metal studs 24" o.c.—2" THERMAFIBER sound atten blankets—wt 6—width $3\frac{1}{2}$ "—UL Des 21-1 hr (f)—TL-63-127 (s)	1 hr.	49
39	Movable Demountable Partition—same as No. 38 without wool—wt $5\frac{1}{2}$ "—width $3\frac{1}{2}$ "—TL-63-126	N/A	42
40	Movable E-Z WALL Partition—concealed "H" studs 24" o.c.—2" THERMAFIBER sound atten blankets— $\frac{3}{4}$ "x24" bevel edge panels factory lamin—joints unfin—wt 7—width $3\frac{5}{8}$ "—USG-93-FT-G & H (s)	N/A	45
41	Movable E-Z WALL Partition—concealed "H" studs 24" o.c. bridged— $1\frac{1}{2}$ " THERMAFIBER sound atten blankets— $\frac{3}{4}$ " x 24" bevel edge FIRECODE panels factory lamin—joints unfin—wt 7—width $3\frac{5}{8}$ "—U of C 12-9-65 (f)	1 hr.	45 (est)

wood joist ceilings

Assembly No.	Description & Test References	Fire Rating	STC Rating(1)	IIC Rating
42	Resil 2 layers $\frac{5}{8}$ " SHEETROCK FIRECODE "C" gypsum wallboard ceiling—1" nom wood sub and fin floor—2x10 wood joists 16" o.c.—RC-1 channel spaced 24" o.c. screw att over base layer wallboard—face layer screw att to channel 12" o.c.—joints fin—UL Des 272-2 hr (f)	2 hrs.	50 (est)	—
43	Resil 2 layers $\frac{1}{2}$ " SHEETROCK FIRECODE "C" gypsum wallboard ceiling—1" nom wood sub and fin floor—2x10 wood joists 16" o.c.—RC-1 channel spaced 24" o.c. screw att over base layer wallboard—face layer screw att to channel 12" o.c.—joints fin—UL Des 22-1 $\frac{1}{2}$ hr (f)	1 $\frac{1}{2}$ hrs.	49 (est)	41 (est)
44	$\frac{1}{2}$ " SHEETROCK FIRECODE "C" gypsum wallboard ceiling—1" nom wood sub and fin floor—2x10 wood joists 16" o.c.—wallboard att with 5d c.c. nails 6" o.c.—joints fin—UL Des 42-1 hr (f)	1 hr.	35 (est)	31 (est)
45	Resil $\frac{1}{2}$ " SHEETROCK FIRECODE "C" gypsum wallboard ceiling—1 $\frac{1}{4}$ " nom wood sub and fin floor—2x10 wood joists 16" o.c.—RC-1 channel spaced 24" o.c.—wallboard att with 1" Type S screws—joints fin—UL Des 41-1 hr (f)	1 hr.	45 (est)	41 (est)
46	$\frac{5}{8}$ " SHEETROCK FIRECODE gypsum wallboard ceiling—American Plywood Assn 2-4-1 floor—4x10 wood joists 48" o.c.—USG metal furring channel spaced 24" o.c.—wallboard att with 1" Type S screws—joints fin—UL Des 28-1 hr (f)	1 hr.	45 (est)	41 (est)
47	Same as 44 except $\frac{5}{8}$ " FIRECODE wallboard att with 6d nails 6" o.c.—joints fin—UL Des 1-1 hr (f)—CK 6412-7 (s)	1 hr.	38	32
48	Same as 47 plus carpet and pad atop flooring—CK 6412-8 (s)	1 hr. (est)	39	56

Assembly No.	Description & Test References	Fire Rating	STC Rating(1)	IIC Rating
49	5/8" SHEETROCK gypsum wallboard ceiling—1 1/4" nom wood sub and fin floor—2x10 wood joists 16" o.c.—3" THERMAFIBER ins wool blankets between joists—wallboard att with 6d nails 6" o.c.—joints fin—CK 6412-6 (s)	1 hr. (est)	41	33
50	Same as 49 plus carpet and pad atop flooring—CK 6412-5 (s)	1 hr. (est)	40	58
51	Same as 45 except 5/8" regular SHEETROCK wallboard with RC-1 channels—CK-6412-10 (s)	1 hr. (est)	47	39
52	Same as 51 except 1/2" FIRECODE "C" wallboard—CK 6512-6 (s)	1 hr. (est)	47	39
53	Same as 45 plus carpet and pad atop flooring—CK-6412-9 (s)	1 hr. (est)	48	66
54	Same as 53 except 1/2" SHEETROCK FIRECODE "C" wallboard—CK 6512-7 (s)	1 hr. (est)	47	67
55	Same as 53 with 3" THERMAFIBER ins wool blankets in joist space—CK 6412-3 (s)	1 hr. (est)	50	46
56	Same as 55 except 1/2" FIRECODE "C" wallboard—CK 6512-9 (s)	1 hr. (est)	51	46
57	Same as 55 plus carpet and pad atop flooring—CK 6412-4 (s)	1 hr. (est)	51	70
58	Same as 57 except 1/2" SHEETROCK FIRECODE "C" wallboard—CK 6512-8 (s)	1 hr. (est)	52	71
59	Same as 44 except 1/2" FIRECODE wallboard—UL Des 1-45 min (f)—NBS-77 P716 (s)	45 min.	36	—

bar joist ceilings

Assembly No.	Description & Test References	Fire Rating	STC Rating
60	5/8" SHEETROCK FIRECODE "C" gypsum wallboard—USG metal furring channel 24" o.c.—wallboard att with 1" Type S screws 12" o.c.—joints exposed or fin—3" concrete or riblath over bar joist—UL Des 82-3 hr (Beam 3 hr) (f)	3 hrs. (beam 3 hrs.)	N/A
61	1/2" SHEETROCK FIRECODE "C" gypsum wallboard—furred or suspended USG metal furring channels 24" o.c.—wallboard att with 1" Type S screws 12" o.c.—joints exposed or fin—2 1/2" concrete deck on riblath over bar joist—UL Des 221-2 hr (Beam 2 hr) (f)	2 hrs. (beam 2 hrs.)	N/A
62	5/8" SHEETROCK FIRECODE gypsum wallboard—furred or suspended USG metal furring channel 12" o.c.—wallboard att with 1" Type S screws 8" o.c.—joints fin 2 1/2" concrete deck on riblath over bar joist—UL Des 63-2 hr (f)	2 hrs.	40db (est)
63	5/8" SHEETROCK FIRECODE gypsum wallboard—furred or suspended USG metal furring channel 24" o.c.—wallboard screw att 12" o.c.—joints fin—2" concrete deck on riblath over bar joist—UL Des 4-1 1/2 hr (f)	1 1/2 hrs.	42db (est)
64	5/8" SHEETROCK FIRECODE gypsum wallboard—furred or suspended USG metal furring channel 24" o.c.—wallboard att with 1" Type S screws 12" o.c.—joints exposed or fin—2 1/2" concrete deck on riblath over bar joist—UL Des 82-2 hr (f)	2 hrs.	40db (est)
65	5/8" SHEETROCK FIRECODE gypsum wallboard—1 1/2" cr channel 4' o.c.—USG metal furring channel 24" o.c.—wallboard screw att 12" o.c.—joints fin—USG-5-FT-G&H (s)	N/A	45db (9-f)

steel column fireproofing

Assembly No.	Description & Test References	Fire Rating
66	PYROBAR Gypsum Tile and Drywall Fireproofing—2" solid tile around column—tile banded 24" from each end—continuous metal angles screw att to bands—1 layer $\frac{5}{8}$ " SHEETROCK FIRECODE wallboard screw att to angles—metal corner beads—joints fin—UL Des 31-4 hr (f)—UL Des 34-4 hr (f)—(based on 3" hollow tile)	4 hrs.
67	Gypsum Drywall Fireproofing—2 layers $\frac{1}{2}$ " SHEETROCK FIRECODE "C" gypsum wallboard around 14 wf 228 column—wallboard screw att to USG #158 metal studs at column corners—metal corner beads—joints fin—UL Des 48-4 hr (f)	4 hrs.
68	Gypsum Drywall Fireproofing—3 layers $\frac{5}{8}$ " SHEETROCK FIRECODE wallboard around column—base and second layers att by DUR-A-BEAD reinforcement and horiz double tie wires—2nd and 3rd layers lamin and screw att to beads—joints fin—UL Des 14-3 hr (f)	3 hrs.
69	Gypsum Drywall Fireproofing— $\frac{1}{2}$ " SHEETROCK FIRECODE "C" wallboard around column—double layer over each flange end—double layer on flange faces separated by USG #158 metal studs and screw att—metal beads on corners—joints fin—UL Des 10-2 hr (f)	2 hrs.
70	Gypsum Drywall Fireproofing— $\frac{1}{2}$ " SHEETROCK FIRECODE "C" wallboard around 14 wf 228 column—wallboard screw att to USG #158 metal studs at column corners—metal corner beads—joints fin—UL Des 23-2 hr (f)	2 hrs.

beam fireproofing

Assembly No.	Description & Test References	Fire Rating
71	Gypsum Drywall Caged Beam Fireproofing—1 $\frac{5}{8}$ " USG metal runner or 2"x1" angle brackets 24" o.c.—2"x1" corner angles att to brackets—three layers $\frac{5}{8}$ " SHEETROCK FIRECODE gypsum wallboard att with Type S screws—1" 20 ga. galv hex mesh on bottom over middle layer—metal beads on corners—joints fin—2 $\frac{1}{2}$ " concrete deck on fluted steel floor—UL Des 214-3 hr (f)	3 hrs. (beam only)
72	Gypsum Drywall Caged Beam Fireproofing—1 $\frac{5}{8}$ " USG metal runner channel brackets 24" o.c.—2"x1" corner angles att to channel brackets—double layer $\frac{5}{8}$ " SHEETROCK FIRECODE gypsum wallboard att with Type S screws—metal beads on corners—joints fin—2 $\frac{1}{2}$ " concrete deck on fluted steel floor—UL Des 254-2 hr (f)—UL Des 255-2 hr (f)	2 hrs. (beam only)

chapter 6

drywall problems and remedies

Intricate framing around heating and air conditioning plenum conceals duct, conserves light from high windows, provides

attachment for light fixtures. Framing of drywall furring channel was partially cut for bending to proper angle.



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A complete understanding of job details plus proper inspection (below) can create trouble-free functional structures.



problems: their cause, remedy or prevention

It is to your advantage to know and understand the conditions which may adversely affect quality of the finished wallboard job.

Almost invariably, unsatisfactory results show up first in the areas over joints or nail heads. Improper application of either the board or joint treatment *may* be at fault, but other conditions existing on the job can be equally responsible for reducing the quality of the finished drywall application.

Irregularities found over joints, for example, usually occur in a straight line pattern. These can be caused by joint ridging, starved joints, joints located over twisted studs or on high studs or joists, board edges damaged or out of plane, joints over which delayed shrinkage has occurred, or any combination of these. By using SHEETROCK SW Gypsum Wallboard—a new rounded-edge board—and low shrinkage DURABOND 90 Multi-Purpose Compound to bond edges in a super-weld joint, many of these problems can be minimized. Joint ridging can be virtually eliminated.

Other compounds used for joint finishing are a “drying type” material and therefore harden as the contained water is evaporated. As they dry, their volume shrinks. Normal shrinkage offers no problem and is anticipated in proper application procedure (see Chapter 3). Excessive shrinkage, which can be a source of trouble, may be found to result from poor atmospheric or job conditions as well as from application abuses.

This is one of the more frequently encountered field problems covered in the tables following in this chapter. Each problem is listed in alphabetical order according to location, with the probable cause and recommended remedy or prevention. Following the tables are discussions of wood shrinkage and its effect on nail popping, precautions necessary in partitions for high-rise buildings, and drywall job inspection procedures.

In the tables the condition, or problem, is listed across the top of each item; under “remedy”, methods of prevention also are included when applicable.

BOARD—Burred Ends

Cause: Ends of boards become roughed up and can be felt as a ridge along end of board.

Remedy: Sand off burr before erecting board.

BOARD—Improperly Fitted

Cause: Board wedged into place or improperly nailed cannot be brought into natural contact with framing (Fig. 1), or may buckle causing one end or edge to override the other.

Remedy: Remove board, cut to fit properly, and replace. Nail

from center of board toward ends and edges. Apply pressure to hold wallboard tightly against framing while nailing.

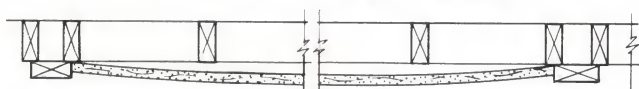


Fig. 1

BOARD—Damaged Edges

Cause: Paper-bound edges have been damaged or abused; may result in ply separation along edge or in loosening of paper from gypsum core. Also may fracture or powder the core itself; edges are more susceptible to ridging when joint system is applied.

Remedy: Avoid butting together damaged edges that may easily be compressed. Handle SHEETROCK Wallboard with reasonable care. Cut back any severely damaged edges to sound board before application. **Preventive measure:** Use of SHEETROCK SW Gypsum Wallboard will reduce the incidence of edge damage because of its exclusive eased-edge design (Fig. 2).



Fig. 2

BOARD—Loosely Fastened

Cause: Framing members are uneven because of minor bowing and warping; lack of pressure on board during fastening. Head of fastener alone cannot pull wallboard into firm contact with uneven members. Also see BOARD—Improperly Fitted.

Remedy: With nail attachment, during final blows of hammer apply additional pressure with hand to board adjacent to nail (Fig. 3) to bring board into contact with framing. **Preventive measures:** For a more solid joint, use 1¼" USG Brand Hi-Lo Screws Type W spaced 12" o.c. Where studs are spaced 16" o.c., space screws 16" apart. To reduce nailing required and to improve attachment bond, use adhesive nail-on method (see Chapter 3).

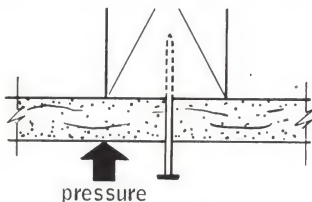


Fig. 3

BOARD—Surface Fractured After Application

Cause: Excessive abuse or heavy blows have fractured finished wall surface—too large a break for repair with joint compound.

Remedy: In shape of equilateral triangle around damaged area, cut out plug of wallboard with keyhole saw, slope edges inward at 45°. Cut corresponding plug from sound wallboard, sand edges to exact fit. If necessary, cement extra slat of wallboard to back of face layer to serve as brace. Butter edges (Fig. 4) and finish as a butt joint with joint compound (Fig. 5).



Fig. 4



Fig. 5

Cause: Attaching board directly to flat grain of wide-dimensional wood framing members such as floor joists and headers. Shrinkage of wood causes fracture of board.

Remedy: As above. **Preventive measures:** To provide a flexible base to allow for movement of framing, attach RC-1 SHEETROCK Resilient Channel to framing members and apply wallboard. Allow 1/2" space at bottom edges of board for movement. Or attach board directly to studs but allow 1/4" separation between panels and install USG Control Joint No. 093 (see Chapter 3—Single Layer Application).

BOARD—Water Damaged

Cause: During transit or storage, water has damaged wallboard; subject to scuffing, may develop paper bond failure. Dissolved glue from bundling tapes may damage board faces and cause them to stick together. If stored wet, may be subject to mildew.

Remedy: Usually will dry and perform satisfactorily; handle board cautiously and re-pile with bundles separated by spacer strips of wallboard. Check incoming board for water stains, protect carefully during shipment and storage. Do not erect damp boards for this may result in paper bond failure.

FINISH—Discoloration

1. Cause: Differences in suction of board paper and joint compound may lighten paint color or change gloss or sheen in higher suction areas; most common when conventional oil

paints are used; also caused by over-thinning of paint. Suction differences may also cause greater amounts of texturing material to be deposited over high suction areas causing color differences when viewed from an angle.

Remedy: Before painting and texturing, seal surface properly with SHEETROCK Sealer or TEXOLITE Primer-Sealer under oil or water-thinned paints; or TEXOLITE Primer under whites or light pastels.

2. Cause: Joint darkening may occur, most commonly with tinted paint color rather than white. Most severe when painting has been done in humid weather or when joints have not fully dried; also when high or medium alkaline joint compounds have been used.

Remedy: Use only U.S.G. joint compounds, formulated with proper alkalinity. Under humid conditions, compounds should dry 48 hours or more between coats. Repaint only after joints are thoroughly dry.

3. Cause: Temperature differentials in outside walls or top floor ceilings cause interior condensation which when combined with airborne dust results in photographing or shadowing over fasteners, furring or framing. Most severe with great indoor-outdoor temperature variation.

Remedy: Wash painted surfaces, remove spots with wallpaper cleaner, or redecorate surfaces affected; change air filters regularly. **Preventive measures:** Use double layer SHEETROCK Wallboard application, which does not require face layer fastening, thus minimizes fastener spotting. Use separately framed free-standing interior wall surface and insulate in void to reduce temperature difference between metal components and wallboard.

4. Cause: Browning may occur over joints when poor quality polyvinyl acetate based paints have been used, primarily in highly humid weather.

Remedy: Redecorate with a quality U.S.G. latex, alkyd flat or texture paint.

5. Cause: Alkali discoloration or "burning" may occur with oil paints tinted with alkali sensitive pigments; appears as color change generally toward red or orange. Caused by diffusion of alkalies from high alkaline joint compounds into paint.

Remedy: Use a U.S.G. joint system, free of this danger. Use water-thinned paints, which have alkali-resistant pigments.

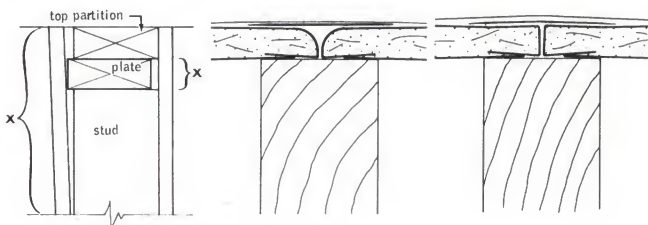
6. Cause: Acid discoloration of paint pigments affects oil or water-thinned paints tinted with ultra-marine blue. Caused by reaction to sulphur gases from unvented gas or oil heaters. Color fades in field of board, leaving bluer color at joints.

Remedy: Avoid use of ultra-marine blue tints in paint; vent all heaters and redecorate.

FRAMING—Members Out of Alignment

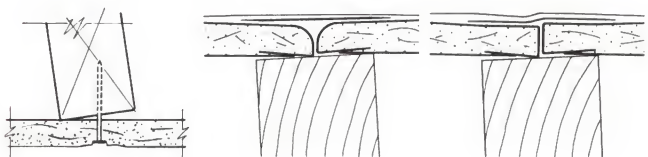
Cause: Due to misaligned top plate and stud, hammering at points "X" (Fig. 6) as board is applied on both sides of partition will probably result in nail heads puncturing paper or cracking board. Chances of nail pops also are increased if board is applied over such misaligned members. Framing members more than $\frac{1}{4}$ " out of alignment with adjacent members make it difficult to bring board into firm contact with all nailing surfaces.

Remedy: Check alignment of studs, joists and plates before applying board, and correct before proceeding. Straighten badly bowed or crowned members. Shim out flush with adjoining surfaces. Use Adhesive Nail-On method of attachment. **Preventive measure:** Apply SHEETROCK SW Wallboard. Rounded edges of SHEETROCK SW tend to minimize possibility of visible defects in wallboard surface.

**Fig. 6****FRAMING—Members Twisted**

Cause: Framing members have not been properly squared with plates, presenting angular nailing surface (Fig. 7). When board is applied, there is danger of puncturing paper with nail heads or of reverse twisting of member as it dries out, with consequent loosening of board and probable nail pops. Warped dimension lumber may contribute to this deformity.

Remedy: Align all twisted framing members before application. Also see Framing Requirements, Chapter 3. **Preventive measure:** Use SHEETROCK SW Wallboard to eliminate sharp, protruding corners.

**Fig. 7**

FRAMING—Protrusions

Cause: Bridging, headers, firestops or mechanical lines have been installed improperly so as to project beyond face of framing, preventing board from contacting nailing surface (Fig. 8). Result will be loose board, and nails driven in area of protrusion will probably puncture face paper.

Remedy: Before applying board, check to make certain there are no protrusions beyond plane of nailing surface. See that they are trimmed off or reinstalled.

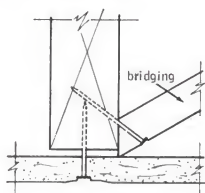


Fig. 8

JOINTS—Blisters in Tape

Cause: Insufficient compound was used under the tape, or tape was not initially pressed into good contact with the compound.

Remedy: Open up blistered area by slitting tape. Fill cut with joint compound and press tape back in place with knife blade. When dry, sand to smooth, level finish.

JOINTS—Cracks in Inside Corners

Cause: Too much compound was applied over tape at apex of angle or excessive structural movement at corners where dissimilar surfaces join.

Remedy: Wipe down corners correctly after applying compound, leaving only a small amount or no compound in apex. If cracks still occur, excessive structural movement is the cause. **Preventive measures:** Where structural movement is cause, use floating interior angle application described in Chapter 3. For controlled cracking where dissimilar surfaces join, slit tape in corners using sharp knife. If cracks do occur, they will be inconspicuous.

JOINTS—Edge Cracking

Cause: After completion of joint treatment, straight narrow fissures or cracks may appear along edges of tape. This can result from: too rapid drying because of high temperature accompanied by low humidity, or excessive drafts; improper application, such as overdilution of joint compound, excessive joint compound under tape or failure to follow embedding with a skim coat over tape; cold, wet application conditions which also may cause poor bond.

Remedy: Especially when poor atmospheric conditions exist, carefully examine all joints after taping and skimming applica-

tions have dried; repairs are more economical at this stage. Cut away any weakly bonded tape edges. Fill hairline cracks with cut shellac (2 to 3 lbs.); groove out larger cracks with sharp tool, coat with shellac and allow to dry, then refill with joint compound; or cover cracks with complete joint treatment including reinforcing tape, feather to even surface with plane of board. **Preventive measures:** Use USG Ready-Mixed Joint Compound or DURABOND Joint Compound which have maximum built-in resistance to cracks; place shielding devices over room openings to prevent drafts; wet down floors if room humidity is too low; during cold weather, control heat at minimum of 55° and supply good ventilation. Avoid practices listed under "Cause," above. Use SHEETROCK SW Wallboard with DURABOND 90 and USG Joint System for maximum joint strength.

JOINTS—High Joints or Crowns

Cause: Needless piling of compound in channel; compound not feathered out beyond shoulders; insufficient sanding; framing out of alignment or board edges not tight against framing.

Remedy: Sand joints to flush surface. If misaligned framing or board are responsible, see "Framing" or "Board" problems, above.

JOINTS—Ridging

Cause: All building materials grow or shrink in response to changes in temperature and humidity. When they are confined to a specific space, such as wallboard panels in a partition or ceiling, they are put under stress, either compression or tension, depending on the temperature or humidity conditions. These stresses are relieved when the wallboard bends outward in the region of the joint. Once this bending takes place, the system takes a set and never returns to normal. It becomes progressively worse with each change of temperature or humidity. This progressive deformation appears as a continuous ridge along length of joint, with uniform fine, ridge-like pattern at the center.

Remedy: (1) Let ridge develop fully before undertaking repairs—usually six months is sufficient. Time repairs for hot and dry conditions. (2) Sand ridge down to reinforcing tape without cutting through tape. Fill concave areas on either side of ridge with light fill of thick mix compound. After this is dry, float very thin film of compound over entire area. (3) Examine area with strong side lighting to make certain that ridge has been concealed. If not, use additional coats of compound. Redecorate.

Preventive measures: Use SHEETROCK SW Wallboard with the exclusive rounded edge designed to prevent ridging. Follow general recommendations for joint treatment (Chapter 1) and approved application procedure (Chapter 3). Pay particular attention to temperature, ventilation, consistency of compound, prompt covering coat over tape, minimum width of fill and finish coats and required drying time between coats.

JOINTS—Excessive Shrinkage

Cause: (1) Atmospheric conditions—slow drying and high humidity; (2) Job conditions—inadequate protection from hot drafts; (3) Insufficient drying time between coats of compound; (4) Excessive water addition in mixing compound; (5) Heavy fills.

Remedy: See “Starved Joints” below.

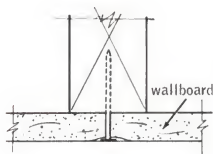
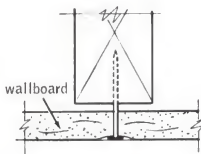
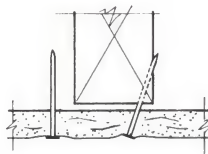
JOINTS—Starved Joints

Cause: This is a form of delayed shrinkage caused chiefly by insufficient drying time between coats of compound. May also be caused by insufficient compound applied over tape to fill channel, over-thinning of compound, or oversanding. Shrinkage usually progresses until drying is complete.

Remedy: Reapply a full covering coat of heavy-mixed compound over tape—since this is heaviest application, most shrinkage will take place in this coat, making it easier to fill channel properly. Finish by standard procedure.

NAILING—Nail Pops

Cause: A protrusion directly over the head of a nail results from outward movement—of the concealed nailhead in relation to the smooth finished surface of wallboard. This protrusion is usually only slightly larger than the nail head but may be about the size of a hammer dimple and is known as a nail pop. It may occur with any type of material secured to wood with nails. With drywall, it is the product of improper application, lumber shrinkage, or a combination of both. With board held reasonably tight against framing member (Fig. 9 below), only severe shrinkage of the lumber normally will cause nail pops. But if nailed loosely (Fig. 10), any inward pressure on board with push nailhead through its thin covering pad of compound. Likewise, board insecurely nailed (Fig. 11) is subject to movement and vibrations which result in nail pops. Pops resulting from “nail creep” occur when shrinkage of the wood framing exposes nail shank and consequently loosens board (see “Wood Shrinkage” discussion following table).

**Fig. 9****Fig. 10****Fig. 11**

Remedy: Repairs usually are considered necessary only for pops which protrude .005" or more from face of board. Smaller protrusions may require repair if they occur in a smooth gloss

surface or flat painted surface under extreme lighting conditions. Those which appear before or during decoration should be repaired immediately. Pops which occur after one month's heating or more are usually caused wholly or partly by wood shrinkage, and should not be repaired until near end of heating season. Repair procedure is to select proper nail for thickness of board, then drive it about $1\frac{1}{2}$ " from popped nail while applying sufficient pressure adjacent to nailhead to bring board in firm contact with framing. Strike popped nail lightly to seat it below surface of board. Remove loose compound and paint. **Preventive measures:** removal of insecure nails and proper nail application; use of lumber meeting Framing Requirements (Chapter 3); attachment with USG Brand Screws or by Adhesive-Nail on Application (Chapter 3).

NAILING—Puncturing of Face Paper

Cause: Twisted or misaligned framing members, protrusions of bridging, poorly formed nailheads, careless nailing, or excessively dry face paper can bring on puncturing problems. Nailheads which puncture face paper and shatter core of board (Fig. 12) have very little grip on wallboard and often cause nail pops.

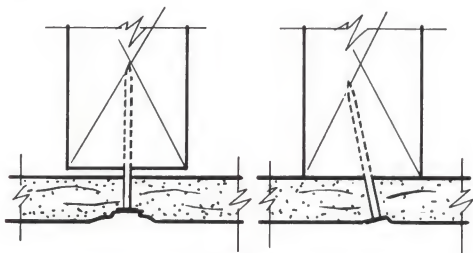


Fig. 12

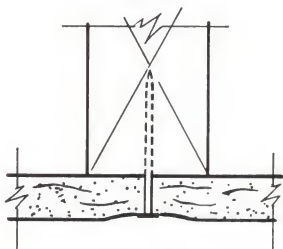


Fig. 13

Remedy: Correction of faulty framing (see Framing Problems, above) and properly driven nails produce tight attachment with slight uniform dimple (Fig. 13). Nailhead bears on paper and holds wallboard securely against framing member. Recommended GWB-54 nails have a head designed to minimize cutting; USG Brand Screws with specially contoured head are best fastener known to eliminate cutting and fracturing. If face

paper becomes dry and brittle, its low moisture content may aggravate nail cutting. One remedy is to hang board in position with a few nails, then sponge or fog spray areas in which other nails will be driven. Other methods are to cover stacked board with vapor-proof plastic sheets and place pails of water under sheets, to stock board on concrete slabs, fog spray the framing, or splash water across floors. Otherwise, replacement of nails and filling of depressions in joint compound may be necessary.

characteristics of wood shrinkage

Framing lumber as commonly used has a moisture content in the range of 15% to 19%. However, individual pieces may be considerably higher or slightly lower.

Wood having a moisture content at the time of construction in the 15% to 19% range may, in service, eventually reach a moisture content of from 5% to 10%, except in the damp Southern coastal states and the dry Southwestern states, where the ranges may be 8% to 13% and 4% to 9% respectively. Thus, when wood is framed into a building and the building is put into service, the framing lumber loses some of its moisture content. After the lumber has eventually reached equilibrium with surrounding conditions, there will be only minor residual increases and decreases in its moisture content. *The important fact to be established here is that the first and by far the greatest change in moisture content usually occurs during the first year after construction, particularly during the first heating season.*

Living wood may contain from 30% to 300% of water. This water is divided roughly into two parts—free water in cell cavities and water *absorbed* by the capillaries of the fibers and ray cells. When all the free water has been removed and the absorbed water remains, the wood is said to have reached the *fiber saturation point*, which is approximately 30%.

Wood shrinks as the moisture content of the wood is reduced below 30%. *As the moisture content of a piece of wood is reduced below the fiber saturation point, the unit of shrinkage is fairly uniform, being approximately 1/30 of the total shrinkage which may occur for each 1% loss of moisture content.*

Wood shrinks most in the direction of the growth rings (flat grain) somewhat less across the growth rings (edge grain) and very little, as a rule, along the grain (longitudinally). Generally, heavier pieces of the same wood species shrink more than the lighter ones. (These characteristics often account for a lot of nail pops along the length of a particular stud or joist.)

Under job conditions, the gypsum wallboard is usually applied within two to four weeks after the building has been enclosed. During this period the framing will dry out to a certain extent, depending upon drying conditions. *However, even under the most favorable drying conditions and four weeks' exposure, it is*

doubtful that the moisture content of the framing will reach a percentage as low as that which will occur "in service."

(The authority for the preceding is U.S. Department of Agriculture publication, Wood Handbook No. 72, in a section titled "Control of Moisture Content and Shrinkage of Wood." Obtainable from Supt. of Documents, U.S. Government Printing Office, Washington 25, D.C.)

Each increment or part of a mass of wood shrinks at a fairly uniform rate. Shrinkage in a mass of wood is toward the center. The movement of any point on the wood or boundary, such as an outer surface towards the center, is equal to the total of the shrinkage of each increment between that point or boundary and the center.

For example, Fig 14 shows a mass of wood 4" wide by 2" thick divided into 1" increments. For purposes of illustration, a total of $1/16$ " shrinkage has been selected for each 1" increment under conditions wherein the moisture content has been reduced from 19% to 10%. The outer plane of Areas "A" has moved $1/16$ " closer to the horizontal center line. The outer surface of Areas "B" has moved $1/8$ " closer to the horizontal center line ($1/16$ " for the shrinkage in Areas "A" plus $1/16$ " for the shrinkage in Areas "B"). Similar proportionate shrinkage also occurs in relationship to the vertical center line.

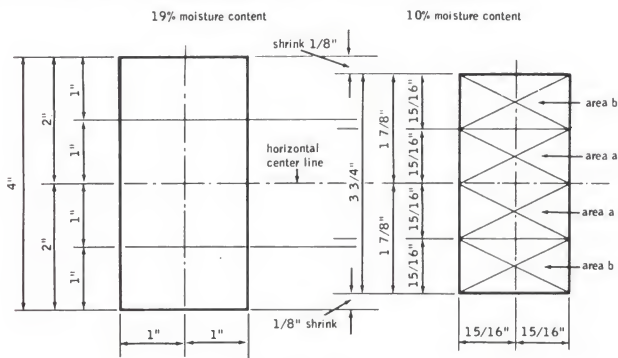


Fig. 14

effect of wood shrinkage on nails

Fig. 15 represents the cross section of a piece of framing lumber with a moisture content of 19% through which has been driven a steel rod with both ends sheared off flush with the surface. The right hand drawing represents the same piece of wood after the moisture content has been reduced to 10%. Note that wood shrinkage has resulted in a movement of each outer edge surface of the wood $1/8$ " towards the center line; also, that the steel rod protrudes from the lumber on each edge $1/8$ ".

NOTE: The dimensions used in Figures 16 to 18 inclusive were

that use of the *shorter* nail resulted in a *smaller* space between back of board and nailing surface.

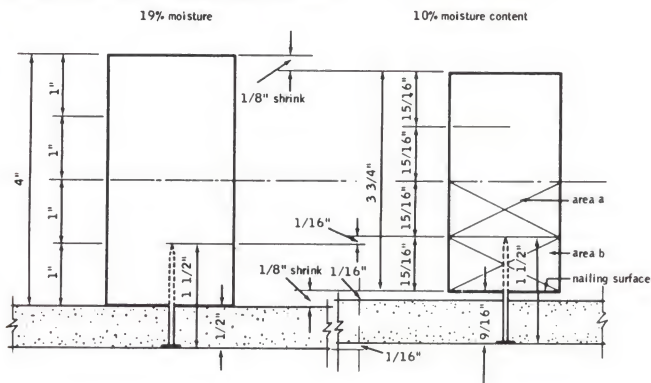


Fig. 17

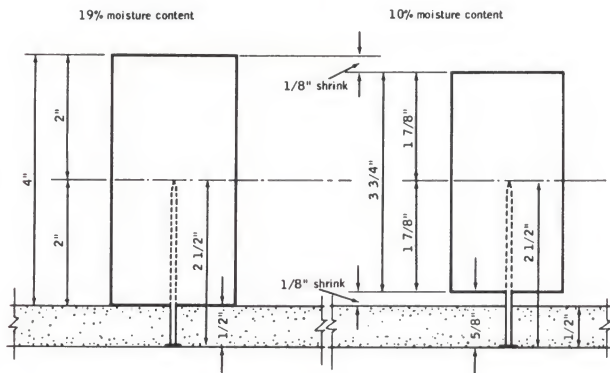


Fig. 18

Extensive experiments conducted by Forest Products Laboratory and Purdue University have shown conclusively that recession of the wood nailing surface from the nail head is almost in direct proportion to the penetration. That is, the longer the nail, the greater the exposure of the nail shank; the shorter the nail, the less the exposure of the nail shank.

nail pops due to wood shrinkage

As previously shown, as the framing lumber shrinks, the distance between the head of the nail and the nailing surface of the framing member increases. Assuming that the nail originally held the gypsum wallboard reasonably secure against the framing, the board is held less securely after the framing has shrunk. If the additional nail shank exposure is in the range of

1/16" (.0625) to 1/32" (.03125) the board will no longer be held tightly against the framing. This is the condition (loose nail) which is the basic cause of nail pops.

Fortunately, minor emergence of a properly driven nail (up to .005") seldom results in a visible pop or nail pops due to lumber shrinkage would be much more common.

If framing lumber has been subjected to a full heating season, chances are good that the lumber has reached an equilibrium moisture content. During the following spring, summer, and fall seasons, the lumber will undoubtedly pick up some moisture and swell to a degree. During the following winter, heating will again result in a loss of moisture content and subsequent shrinkage. Although there is little factual data on what actually occurs, it is believed seasonal fluctuations are usually in the range of not more than 2% to 4% moisture content differences. Under these conditions, movement is so slight that there is little danger of future pops.

cracking problems in high-rise structures

Drywall contractors who install commercial partitions should be aware of the cracking problems that have recently been identified in high-rise buildings employing "flat plate" reinforced concrete construction. In this design the underside of the concrete structural floor slab becomes the base for a ceiling.

Cracking of partitions has occurred in "flat plate" buildings—most seriously in the upper floors—in various parts of the U.S. Extensive research by United States Gypsum has established that this cracking occurs in two distinct patterns traced to two different probable causes associated with the design of the building. *Neither can be attributed to faulty materials.*

One pattern, known as **Type A**, usually occurs in the form of cracks and gaps at opposite corners of partitions which connect an exterior and interior column (Fig. 19). Diagonal cracks may also show up on the face of the partition if the edges are unusually well reinforced.

This type of partition failure, found primarily in buildings where exterior columns are exposed, results from racking of structural elements that surround and support the partition. The racking is believed due to movement of exterior columns and beams as outside temperatures change. The cracking may still occur, but is less severe when the partitions are supported by a suspension system.

On the basis of research and job experience, two factors can be estimated—the "*critical height*" above which Type A cracking may occur in flat plate buildings of various heights; and the *amount* of slab deflection, resulting from column movement,

that may be expected in those buildings in various climatic areas of the U.S.

Both factors are shown in the table below. The amounts of anticipated deflection are given for four different temperature ranges based on low average winter temperatures ($+20^{\circ}$ to -20°F.). The movement for all four ranges is calculated from a 70° average. It is assumed that upward movement from summer temperatures and sun load will be no greater than the downward deflection in winter.

Height of Building	Critical Height	Calculated Amount of Slab Deflection			
		70° to $+20^{\circ}$	70° to 0°	70° to -10°	70° to -20°
10 floors—95'	6th floor	.106"	.156"	.180"	.200"
15 floors—140'	8th floor	.160"	.230"	.260"	.295"
20 floors—185'	10th floor	.220"	.305"	.350"	.390"
25 floors—230'	12th floor	.270"	.378"	.430"	.485"
30 floors—275'	14th floor	.320"	.450"	.520"	.585"
35 floors—320'	16th floor	.375"	.525"	.600"	.675"
40 floors—365'	18th floor	.430"	.600"	.680"	.765"

The second pattern of cracking, identified as **Type B**, is predominately found near the center of a partition span (Fig. 20). It is believed to be the result of flexural tension as the wall panel tries to follow the deflection of the flat plate floor and/or ceiling. Flexural cracks are widest at the bottom, and run out as they move vertically up the partition. They are typically much narrower than Type A cracks and may be expected anywhere in the building, not just on the upper floors. They are less likely to occur when the wall connects to a suspended ceiling than when it extends to the bottom of the structural floor.

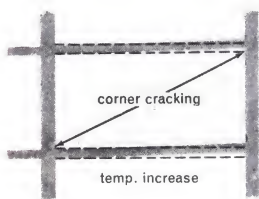


Fig. 19—Type A

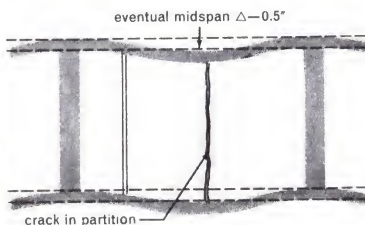


Fig. 20—Type B

Not only is Type B cracking less severe than Type A, but the probable amount of deflection in the flat plate—responsible for its occurrence—can be calculated by the structural engineer in advance with reasonable accuracy.

The question of "What can be done about it?" has at least four prospective answers:

1. After the cracking has occurred, repairs can be undertaken—but they are likely to be successful only in the case of Type B cracking. Since the basic deflection gradually decreases, Type B cracks can be filled satisfactorily after about one year. On the other hand, Type A cracking cannot be repaired by filling the cracks, since the racking distress reverses with a change in

seasons. A corner that is now being pulled apart will show signs of compression six months later.

2. In design of the building, anticipated structural movement in the frame and deflection in the floor system should be taken into account. Preliminary investigation indicates that exposed concrete columns and shear walls can be safely used in structures from six to ten stories high in most areas.

3. For the critical upper floors of a taller flat plate building (see table, above), the architect should select, or the contractor should suggest, partition and ceiling systems that have sufficient resistance to the stresses causing Type A cracks. Also, to reduce the amount of movement of exterior beams and columns due to temperature changes, insulation should be installed or other measures used to counteract critical conditions.

4. Control or "slip" joints should be provided at the periphery of walls installed on critical floors. Such joints minimize the effect of both structural movement and flat-plate deflection. USG Control Joint No. 093, which relieves stresses across the joint, should be used on long runs or wide expanses of gypsum wall-board where there is danger of cracking or buckling due to thermal or structural movement. See Chapters 1 and 3.

It is clear that problems of partition cracking with flat plate construction are best met by preventive measures before installation, rather than by attempted repairs afterward. Meanwhile, United States Gypsum is making intensive efforts to develop partition walls that can accommodate the building movements, rather than resist them—and still maintain past economies.

how to inspect a drywall job

Proper drywall job inspection during installation many times reveals potential problem areas or procedures that will produce unsatisfactory results. Corrective action taken immediately is usually less costly than callbacks to repair and perhaps rebuild walls and ceilings after the job is completed.

A complete understanding of job details, schedules, and specifications is necessary to conduct proper inspection. If the assembly is to meet fire and sound rating requirements, then construction details must also be known. All walls and ceilings must be judged by these criteria and the awarded contract. Thus it is important that drawings and specifications be complete, accurate and easily understood.

The following discussion is aimed at preventing trouble before it starts. Proper planning and attention to printed instructions will many times eliminate the need to refer to earlier parts of this

chapter. A better, high quality drywall job will be produced with a minimum of effort and unprofitable extra cost.

SCHEDULE OF INSPECTION

Make job inspections at the following stages:

- A.** When drywall materials are shipped to the job, (1) verify material meets specifications and approvals, (2) check for proper storage of materials (see Chapter 1). Damaged material should not be used.
- B.** When framing is erected but before wallboard application.
- C.** When base layer is applied; when face layer is applied.
- D.** When joints are treated, (1) during taping and first coat application, and (2) during second coat application.
- E.** When job is completed.

INSTALLATION INSPECTION

Job inspection should include the installation of *all* materials with particular attention directed to the following items:

Framing

- 1.** Check accuracy of alignment and position of framing according to plans or details.
- 2.** See that partitions are straight and true; ceilings level.
- 3.** Measure spacing of studs and joists. Spacing should not exceed maximum allowable for the system.
- 4.** Verify that there is caulking beneath runners, if required.
- 5.** Look for protrusions of blocking, bridging, or piping, and twisted studs and joists that would create an uneven surface. Correct situation before wallboard attachment.
- 6.** Make sure there is appropriate blocking and support for fixtures and wallboard.
- 7.** Measure the moisture content of wood framing with a moisture meter. Delay wallboard application until moisture content is 15% or less.
- 8.** Check to see that window and door frames, electrical and plumbing fixtures are set for the wallboard thickness used.
- 9.** Check for proper position and attachment method of RC-1 Resilient Channels.
- 10.** Review all wood framing for compliance with minimum framing requirements outlined in Chapter 1.
- 11.** Examine metal studs at corners, intersections, terminals, door and borrowed light frames for positive attachment to floor and ceiling runners.
- 12.** Inspect spliced metal studs for proper assembly.
- 13.** See that door and borrowed light frames are securely attached to stud and runner rough framing at all anchor clips.
- 14.** Look for spot grouting at door and borrowed light frames.

Suspended Grillage

1. Measure spacing of hangers, channels and studs to see that they are within allowable limits.
2. Check ends of main runner and furring channels. They should not be let into or supported by abutting walls, and should extend to within 6" of the wall to support a furring channel.
3. Make sure furring channel clips are alternated and that furring channel splices are properly made.
4. See that mechanical equipment is independently supported and does not depend upon the grillage for support.
5. Inspect construction around light fixtures and openings to see that recommended reinforced channel support is provided.

Base Layer

1. Verify that material being used complies with the specifications and fire or sound test construction.
2. Make sure the proper type of application is being used, horizontal or vertical application, and that joints are staggered.
3. Check for cracked and damaged edge board. These should not be used.
4. See that the recommended fastener is being used and measure the spacing of fasteners.
5. Check caulking for proper seal behind electrical boxes, medicine cabinets, etc.
6. Inspect installation to make sure insulating wool blankets are adequately attached and properly fitted.
7. Review appropriate system construction and application, and inspect for compliance with laminating recommendations and other construction procedures.

Face Layer

1. Verify material compliance.
2. Look for high quality workmanship. Cracked or damaged edge board should not be used. Wallboard surfaces should be free of defects; joints correctly butted and staggered.
3. Check proper application method—horizontal or vertical.
4. Examine fasteners for compliance with specifications, and measure the spacing of fasteners.
5. Review adhesive application method and see that recommendations and specifications are being followed.
6. Inspect trim at corners and around partition perimeter for secure attachment and proper installation.
7. Make sure that caulking is applied where required and completely seals the void.
8. Review back-blocking installation to be sure correct procedure is followed (see Chapter 3).

Fasteners

1. Make sure recommended or specified fasteners are used.
2. See that fasteners are applied starting in the center of the wallboard and working to the ends and edges.
3. Observe whether the board is held tightly against the framing. Test for loose board by pushing adjacent to the fastener. Check to see that the face paper is not broken when fastener is driven. If necessary, a second fastener should be driven within 1½" of the faulty one.
4. Examine fastener positions. Fasteners should be at least ¾" in from edges and ends.

Adhesives

1. See that adhesive is applied only to clean, dry surfaces.
2. Make sure that board is erected within the allowable time limit after adhesive is applied so proper bond can be obtained.
3. Measure size of bead and spacing. Check for correct shape.
4. Observe impacting blows for proper spacing and positioning.
5. Make sure temporary fastening and shoring holds board tightly in place.
6. Review the appropriate adhesive application methods (Chapter 3) and inspect for compliance.

Joint Treatment

1. Make sure wallboard surface is ready for joint treatment. Fastener heads should be properly seated below wallboard surface. Protrusions should be sanded below level of surface. Cracks between panels should be filled with joint compound before taping.
2. See that recommended mixing directions are followed (see Chapter 3). Only clean water and mixing equipment should be used. DURABOND Joint Compounds should not be held over or retempered.
3. USG Brand Joint Compounds can be used almost immediately after mixing. Make sure that directions are followed closely both for mixing and application.
4. Inspect joints and corners to see that the tape is properly embedded and covered promptly with a thin coat of joint compound. Only compounds suitable for embedding should be used. Heavy fills should be avoided.
5. Make sure that compound is used at its heaviest workable consistency and not over-thinned with water.
6. Check to see that joint compound is allowed to dry thoroughly between coats (see Drying Time Guide, Chapter 3). Ex-

ception: DURABOND Joint Compound-Taping need only have hardened prior to the fill coat application.

7. Inspect second and third coats over joints for smoothness and for proper edge feathering. Only compatible compounds should be used over DURABOND compound.

8. Examine fastener heads and metal trim to see they are completely covered.

9. See that all finished joints are smooth and dry before decoration. Sand smooth if necessary.

Temperature

In cold weather, see that temperatures between 55° and 70°F are maintained both day and night. This temperature should be maintained 24 hours before, during and after the entire wall-board and joint treatment application (see Chapter 1).

Ventilation

Check for proper ventilation to provide drying of joint compound in about 24 hours. Avoid drafts during hot dry weather that cause too rapid drying of compound (see Chapter 1).

Special Applications

Review installation recommendations for special applications such as back-blocking, floating angle, predecorated board, SHEETROCK W/R wallboard, arches, sliding door lamination and see that procedure is correct.

chapter 7

tools



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THE TOOLS YOU NEED

Suitably designed tools are of major importance in assuring a high quality of workmanship. The right tools for a particular job can result in improved efficiency and man-hour savings. In this section you will find tools specifically designed to meet the needs of the drywall contractor. In addition you will find information on tool construction, rental, purchase and application.

Through long experience it has been found that some tools may be easily and economically fabricated on the job. Construction details, instruction in use, and application of these tools also are included.

Where applicable, the original manufacturer is mentioned in the discussion of each tool. In addition a symbol is used to denote another source or sources of procurement. Here is the key to the symbols used throughout this section.

KEY TO SYMBOLS USED

* Wallboard Tool & Equipment Co.
1708 Seabright Ave.
Long Beach, Calif. 90813

† Goldblatt Tool Company
1910 Walnut St.
Kansas City, Mo. 64141

▲ Camco Supply Company, Inc.
5833 Outlook
Mission, Kas. 66202

★ Available from *, †, ▲

†† Ames Taping Tools, Inc.
505 O'Neill Ave.
Belmont, Calif. 94002

** Behr Manning Co.
Troy, N.Y. 12180

(H) Available at hardware stores

(L) Available at lumber dealers

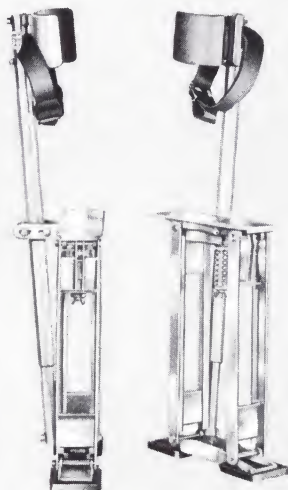
(P) Available at paint stores



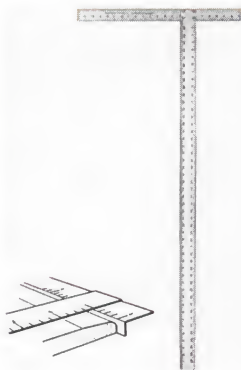
wallboard application tools

handling

Foot Power Wallboard Lifter—This device is designed to move wallboard against the wall as it lifts. The tool is primarily used to raise the lower course of horizontally applied SHEETROCK Wallboard into nailing position. Vertically applied SHEETROCK may be raised in the same manner. The lifter is available from B. E. Gillespie, Box 446, Refugio, Texas 78377. A similar tool is also available from Ames Taping Tools, Inc.



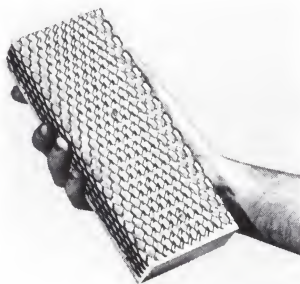
Stilts—To eliminate cumbersome scaffolding or ladders, adjustable stilts are used for reaching higher work areas.†



measuring

Steel Rule—King-size white face steel rule with Tru-Guide measuring aid and Tru-Cut tape-tip.★

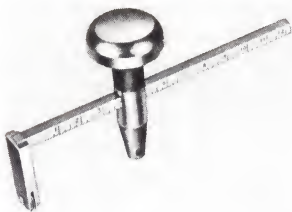
Straight Edge—A calibrated metal straight edge and T-square used as a guide in making cuts across the full four-foot width of the wallboard. It eliminates the need for drawing lines, thus speeds accurate cutting. A metal edge is preferred because it prevents the knife from cutting into the edge as wallboard is scored.★ Also available in special design for rounded-edge SHEETROCK SW Wallboard.†



cutting

Trimming Knife—The Stanley Trimming Knife No. 199, with changeable blades, is used to score gypsum wallboard. It should be kept sharp to cut the paper cleanly and to score the core. The handle is taken apart to change blades. Spare blades are inside. Manufactured by Stanley Tool Co., New Britain, Conn. 06050.† (H)

Rasp—This tool is made on the job and is used to trim or smooth cut SHEETROCK ends or edges. It consists of a 2"x4" wood block with metal lath stapled to the face.



All-Round Circle Cutter—Cuts clean, sharp, round holes in gypsum wallboard up to 12" in diameter.★

Utility Saw★, Keyhole Saw (H)—Used for cutting small openings and making right-angle cuts in gypsum wallboard.

hammers

The proper hammer for nailing SHEETROCK wallboard has round edges and a slightly crowned head which forms a "dimple" in the face of the board as the nail is "driven home." A hammer with a flat head and sharp edges will fracture the paper around the nail head and these cracks around the hammer head imprint may eventually appear through the decoration. The head of a lather's hatchet is too flat and its corners too sharp. A ball-peen hammer is too heavily crowned. A regular hammer head may be easily crowned with a file, if necessary. For driving nails in U.S.G. predecorated wallboard, a plastic headed hammer, a rawhide mallet, or a regular hammer covered with pliable leather should be used to avoid chipping the enameled nail head.



16 oz. Crown Head—Carpenters' claw hammer with crown head will dimple wallboard properly. (H)

Plastic Headed Hammer—For driving special nails used with

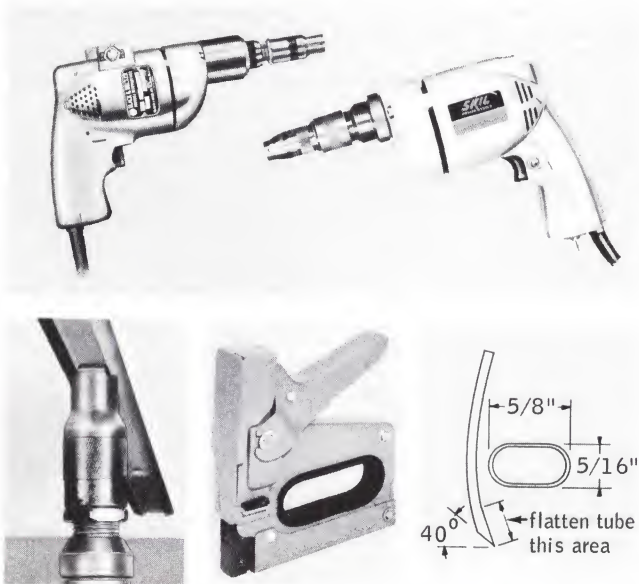
predecorated wallboard and applying trim in SHEETROCK Demountable Partition. (H)

Wal-Board Hammer—Has a symmetrical convex face designed to compress wallboard and leave a perfect "dimple."★

Rubber Mallet—For impacting wallboard in adhesive nail-on method of application. (H)

power-driven screwdrivers

The electric, power-driven screwdrivers shown here are the type used to drive USG Brand Screws Types W, S, S-12, and G for attachment of gypsum wallboard to wood or metal framing or to gypsum core materials in laminated construction. These tools are designed to drive Phillips head steel screws to a preset depth below the wallboard surface, where the bit tip will be disengaged by a clutch mechanism. The magnetic bit tip holds the screw in position, ready to be driven. The tool may be set for various screw depths. Two models, heavy-duty and standard, are manufactured by Black & Decker Mfg. Co., Towson, Md. 21204; Millers Falls Co., Greenfield, Mass. 01301; Skil Corporation, 5033 No. Elston Ave., Chicago, Ill. 60630; Milwaukee Tools, 2773 So. 29th St., Milwaukee, Wisc. 53315; and Rockwell Mfg. Co., Power Tool Divn., 700 Marcellus St., Syracuse, N.Y. 13201. When ordering specify voltage desired: 115V or 220V AC/DC.

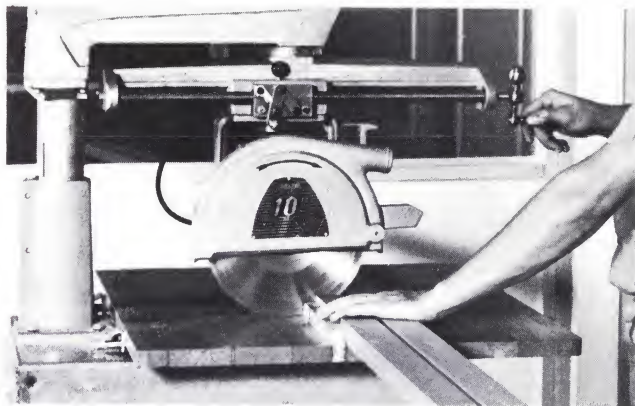


Finder—This accessory permits faster and neater screw attachment of aluminum battens in the SHEETROCK Demountable Par-

tition. Part No. 52103, available from Black & Decker Mfg. Co., Towson, Md. 21204.

Pistol-Type Stapler—Used to attach base layer wallboard to wood studs and THERMAFIBER Insulating and Sound Attenuation Blankets. (H) (L)

Batten Insert Tool—Use to speed insertion of vinyl strip in batten on USG Demountable Partitions. Cut from 6" length of ½" copper tubing; shape one end to a 50° angle and flatten tube to oval shape as shown. As vinyl strip feeds through, lip of tool provides flex in strip for easy insertion.



metal fabrication tools

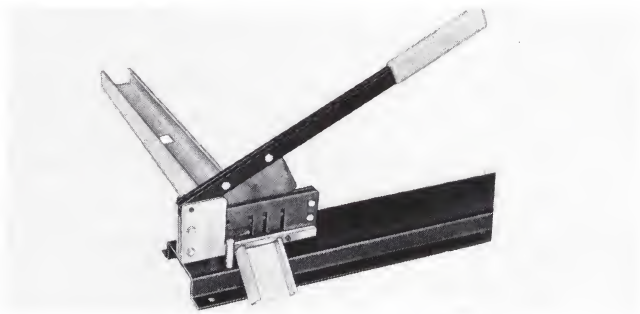
10" Radial Saw—An excellent unit for cutting aluminum USG Demountable accessories to size or for mitering and coping. Saw has movable 1-HP, 115/230 V, 3450 rpm motor with precision manual feed for fast, safe, accurate cutting. Components are held tightly to stationary table and stops, thus permitting more accurate cutting than with table top saws in which work is moved. Completely portable—unit weighs only 200 lbs. Easily removed from one location to another for on-the-spot cutting. Available from Alum-Cut Saw Attachment Co., 401 N. Olive St., South Bend, Ind. 46628. Model: Delta Super 990 10" Radial Saw with Alum-Cut attachment.

Aluminum Cutting Saw Blade—A special aluminum cutting blade, 10" diameter, 100 teeth with 5/8" diameter arbor hole comes with above described saw. Also highly suitable is a non-ferrous metal cutting blade made of semi-hard high speed steel, 1/16" thick, hollow ground, 190 teeth, no set in teeth, manufactured by Simonds Saw & Steel Co., 3323 W. Addison St., Chicago, Ill. 60618.

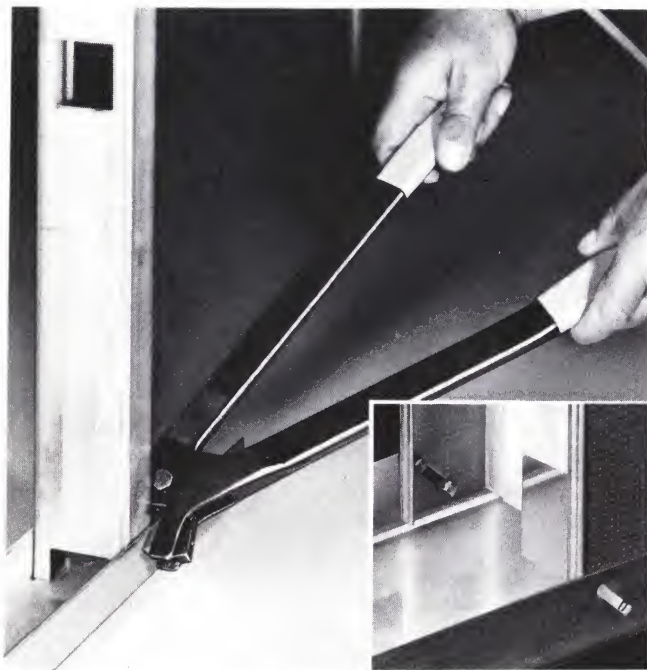
Keep saw blades sharp for smooth clean cuts; use lubricant of automobile motor oil, water emulsified oil or kerosene.

Other manufacturers produce saws and saw blades satisfactory for sawing aluminum components. Before purchasing new

equipment or adapting existing tools, contact reputable suppliers or manufacturers for their recommendations.



Stud and Runner Shear—A versatile tool for the drywall installer. The SR-6 Channel Shear is designed to cut 1½" to 3½" studs and runners.†



USG Metal Lock Fastener—Specially designed to rigidly attach metal studs to drywall runners and metal trim to drywall studs. This tool quickly pierces and folds over light gauge metal to form a positive, permanent lock. It insures a smooth stud face without fastener protrusions for flush wallboard attachment. Available from United States Gypsum.



Welding Gun—Automatically produces a perfect button weld on light metals by an arc welding process. The gun automatically attains proper welding heat, leaves a metal deposit with perfect penetration, controls the electrode burn-off length and stops the arc when the weld is completed. Used to secure metal studs to runners and steel door frames, also to splice studs. Models operate on 110-115V or 115-230V electricity. Manufactured by Marquette Manufacturing Co., 307 E. Hennepin Ave., Minneapolis, Minn. 55414.

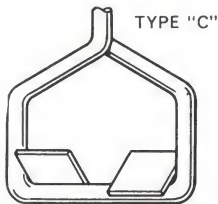
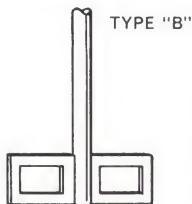
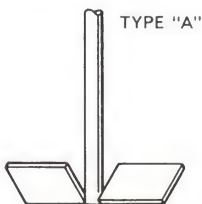
Hand Shear—Cuts holes for electrical and plumbing installations in metal studs. Quickly and easily driven with hammer blows. Available from Whitney Metal Tool Co., 724 Forbes St., Rockford, Ill. 61101.

joint treatment tools

mixing equipment

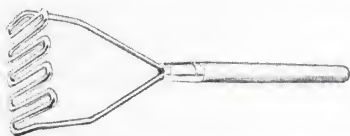
While hand mixing of U.S.G. joint compounds is adequate, many applicators prefer electric mixers. Power mixing saves considerable time, particularly on large jobs where mixing in a central location is convenient.

Power is supplied by a $\frac{1}{2}$ " heavy duty electric drill operating on 115 volts AC-DC at not over 400 rpm. Drills operating at high speeds will whip air bubbles into the joint compound, rendering it unfit for finish coat purposes. If available at reasonable costs, drills of 200 to 300 rpm are even better.



Mixing Paddles—Mixing paddles may be any one of the above types or variations thereof consisting of a $\frac{3}{8}$ " diameter shaft

about 24" long to which blades are welded. Type "A" blades are approximately 1¼"x3" welded on at an angle of 45°. Type "B" has three equally spaced blades approximately 2"x3½" welded in line with the shaft. Slots approximately 1"x2" are cut out of the blades to allow the compound to work through the blades in a folding action. Type "C" has blades approximately 2"x2" welded at a 45° angle on the bottom leg of a 4"x6" stirrup. Material for the blades is ⅛" strap iron, for the shaft is ⅜" round iron—both available at wrought iron fabricating shops. Other mixers, manufactured in a variety of designs, are available from Goldblatt Tool Co.†



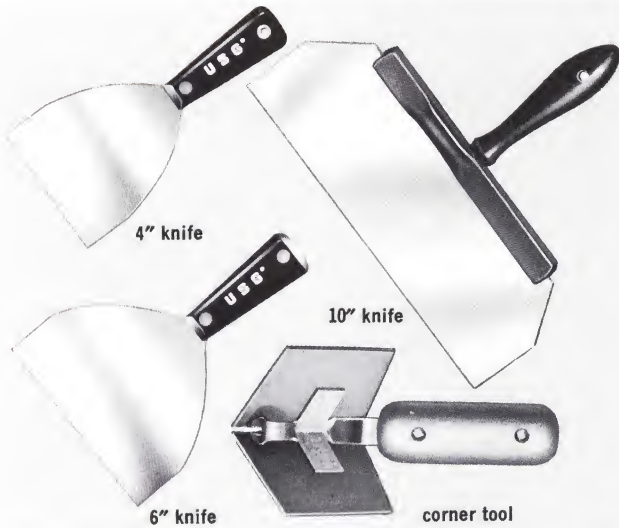
Potato Masher—Used to hand mix joint cement. Available at restaurant supply companies or drywall accessory suppliers.††★



Mud Pan—Made of long-wearing plastic, it is nonbreakable and unaffected by temperature changes or chemicals. Size 12"x4⅝". Also available in steel with tapered ends, rolled edges and spring steel wiping blades—size 15"x4⅝".†

tape applicators

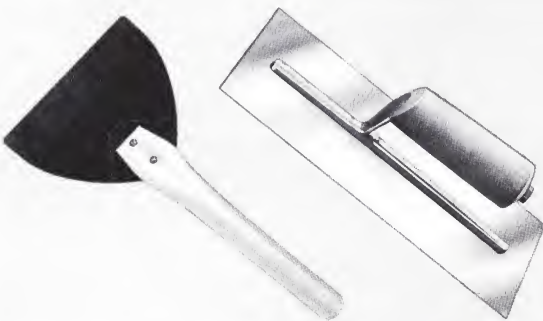
4", 5", & 6" USG Joint Finishing Knives—Dual purpose taping tools with squared corners. Professionally designed for



flat work or to effectively work both sides of corner at one time. Available with either plain handle (as in 4" knife shown) or hammer head handle (as with 6" Knife). Also available in regular shaped, standard blade knives (not shown). Available from United States Gypsum.

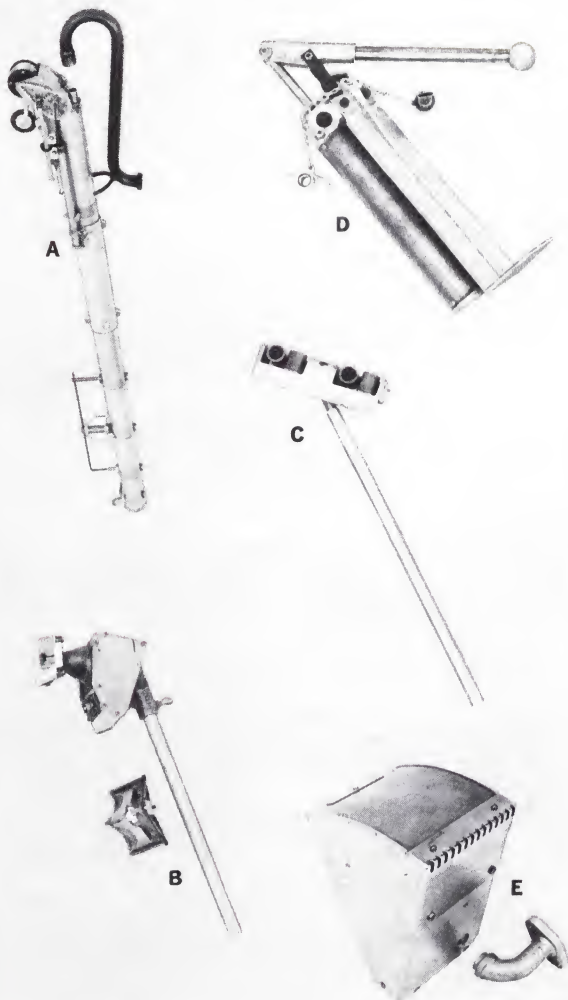
10" USG Joint Finishing Knife, United States Gypsum—Plain handle only. (H) (L) (P)

PERF-A-TAPE Corner Tool—Permits application of tape and joint compound to both sides of a corner at once. United States Gypsum. (H) (L) (P)



Broad Knife—Used for wiping excess joint compound from taped joints. Available with regular or long handle; 7" or 9" replaceable blades.

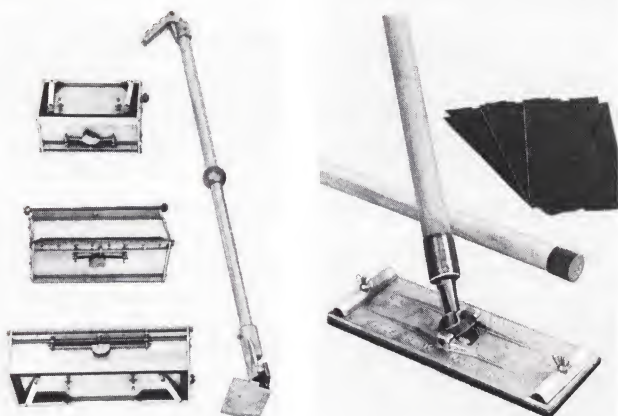
11" Trowel—Used to apply joint compound in large areas or may be notched for use as a spreader tool. (H)



Automatic Taper (A)—Applies tape and proper amount of joint compound simultaneously to flat joints or corners. Designed for high volume machine tool application.††

Corner Roller (B)—Used to embed tape in corner and force excess compound from under tape prior to finishing. **Corner Finisher (C)**—distributes excess compound evenly over tape and feathers edges.

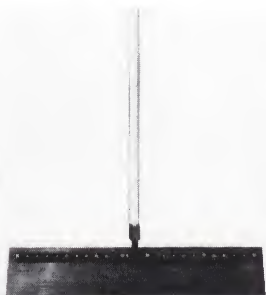
Hand Pump (D)—fills mechanical tools from 5-gal. pail. **Flat Applicator (E)**—finishes over fastener heads.††



finishing tools

7", 10", 12" Ames Finishing Tools—Used for application of successive coats of U.S.G. Joint Compounds. Also used for mechanical tool application of COVER COAT Compound.††

Pole Sander—Used for sanding ceilings and walls from the floor. Tool has a 48" handle, aluminum sanding block, and a universal joint.††



Pole Drywall Blade—Used for smoothing and finishing COVER COAT applications. Tool has 48" handle and replaceable spring steel blade 24" or 26" wide. Also known as Ames Acoustical Knife.††

Sling Psychrometer—Used to determine temperature and humidity for figuring joint compound drying time. Available from chemical supply firms.

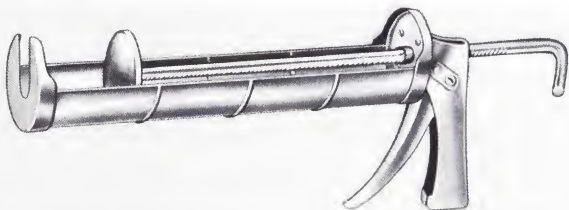
"Durite Screen-Bak" Sanding cloth—320 grit (fine) and 220 grit (medium). Used for sanding successive layers of joint compound.** (Not illustrated.)

wallboard lamination tools

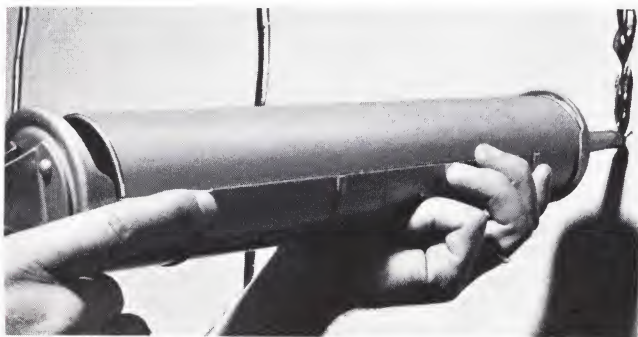


adhesive nail-on equipment

Model A-3 Drywall Adhesive Applicator—This caulking-type gun has a trigger mechanism which stands rough usage and offers minimum resistance to a large bulk load of adhesive. Ratchet rod and precision construction aid in uniform application of adhesive. Barrel is 16" long and 3½" diameter with a quarter-turn or fully threaded breech cap. Nozzle has a wedge-shaped nose with a ⅜" opening. Capacity of the gun is 2½ quarts and weight is approximately 8 lbs. Available from United States Gypsum.



Model A-2M Drywall Adhesive Gun—This cartridge-type caulking gun is light in weight and easy to handle. The trigger mechanism's bearing is mounted to withstand rough usage and offers minimum resistance to a ¼ gal. cartridge for adhesive. The ⅜" ratchet rod is specially heat treated for long wear. Precision construction makes for even and steady application of adhesive. This applicator has a 1-qt. capacity. The reinforced cradle barrel is 13¼"x2¾", provides a generous flow of adhesive. The gun nozzle has a ⅜" orifice and wedged nose. Weight about 3 lbs. Available from United States Gypsum.



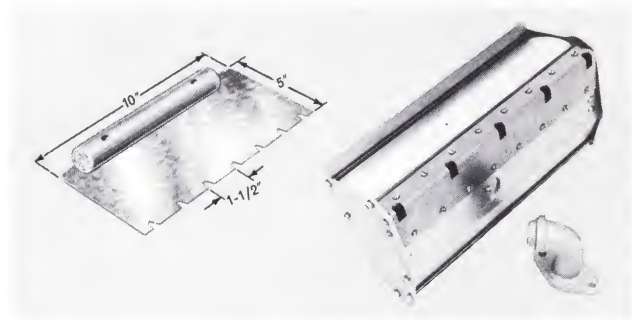
joint compound and adhesive spreaders

While there are a variety of manufactured spreaders available for use in wallboard lamination, it may be necessary to provide additional spreaders which can be made on the job. Stainless or galvanized sheet steel makes the best spreader. Spreader made of other materials do not provide spreading action because joint compound tends to accumulate and dry in the notches. The metal spreader should have the approximate stiffness of a plaster trowel and be kept reasonably clean at all times. Apply a firm downward pressure on the spreader as it is drawn across the SHEETROCK surface.

SHEET AND STRIP LAMINATION

This spreader is generally used when back blocking walls and ceilings, laminating sliding door installations and applying double layer laminated wallboard to wood or metal framing. Notches are spaced $1\frac{1}{2}$ " to 2" o.c. Each notch is $\frac{1}{2}$ " deep, $\frac{3}{8}$ " wide at the base with an inverted "V" shape. A piece of wood dowel, window stop, etc., provides a grip when attached near the edge of the blade.

For notch size and spacing of adhesive beads used in various partition systems, refer to the particular system description in Chapter 4.



Mastic Spreader—Used to apply adhesive in vertical strips to base layer gypsum boards or coreboard in strip laminated partition construction.††

miscellaneous tools

caulking equipment

WALK-A-CALK Caulking Applicator—For use in applying caulking to seal under runners and around openings. Compound is pumped from a 5-gal. pail under air pressure through a nozzle at a constant rate of flow. Trigger cut-off. Requires 125 psi air compressor that delivers 5 cfm. Available from Stewart-Warner Corp., Alemite Div., 1826 Diversey Parkway, Chicago, Ill. 60614.



Caulking Loader—Model 4-A "Force-Flo" Caulking Loader for filling a USG Model A-3 Drywall Adhesive Applicator from a standard 5-gal. pail. Available from Force Flo, Inc., P.O. Box 2442, East Cleveland, Ohio 44112.



materials handling equipment

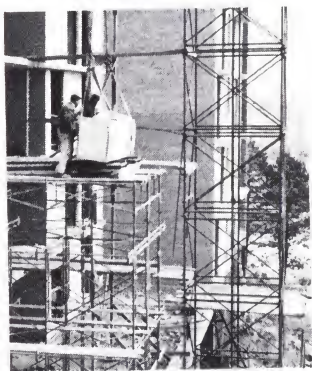
The development of better systems with improved sound and fire resistance has opened a whole new opportunity for drywall in high-rise construction. Important to these applications is efficient, low cost handling of wallboard at the job site. This includes elevating the materials to the required heights, unloading and distributing them damage-free to the point of use.

A large variety of equipment is available to do the job. Some may be rentable and some furnished by the general contractor. Job situations vary with each building. Thus, the following description is intended to give a basic understanding of terms and types of equipment used. Further consultation with suppliers for their recommendations should be undertaken before an expenditure is made. The U.S.G. Trade Services Department is also available to help contractors solve problems relating to materials handling equipment and methods.

Look-Out Platform—A portable braced platform or shelf extending from the building which supports material delivered by crane. Can be fabricated locally from steel I-beams or channels and lumber decking.

Sling—A device wrapped around a load or unit of material to enable a crane to lift the entire load. Three-tined fork sling, manufactured locally from 4" I-beams, has an 84" spread and 47" long lines. Other slings are manufactured by: Liftex Sling Inc., P.O. Box 368, Libertyville, Ill. 60068; Columbian Rope Co., 309 Genesee St. Auburn, N.Y. 13021.

Tubular Tower—A four poster, single or double-wall hoist. Manufactured by: American Tubular Elevator Co., Zelienople, Pa.; Beaver Advance Co., Elwood City, Pa. 16117.



*Look-out platform,
sling and tower*

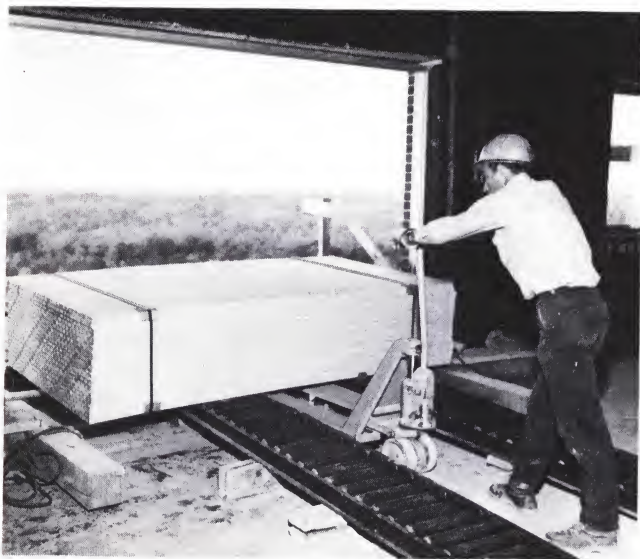


*Fork sling
moves heavy loads*

Platform Hoist—A cantilevered platform lifting device. Manufactured by: Buck Equipment Co., 720 Anderson Ferry Rd., Cincinnati, Ohio 45238; Champion Mfg. Co., 3700 Forest Park Ave., St. Louis, Mo. 63108.

Mobile Crane—A truck, crawler or railway-mounted crane. Manufactured by: Harnischfeger Corp., Milwaukee, Wisc. 53246; Bucyrus-Erie, P.O. Box 1144, Milwaukee, Wisc. 53201 (shown on page 2).

Hand Pallet Truck—A manually operated lifting device which raises a load hydraulically and is used for distribution of material. Manufactured by: Raymond Corp., 159 Madison St., Green, N.Y. 13778; Wright-Hibbard Industrial Truck Co., 19th & West End Ave., Pottsville, Pa. 17901.



spray texturing equipment

A large variety of equipment is available for use with U.S.G. products in spray-texturing drywall surfaces. Since application varies with the texturing product and finish desired, U.S.G.'s Paint Application Methods direction sheets, which gave pressures, flow rates and basic equipment requirements should be consulted when selecting spraying equipment. Recommendations should be obtained from suppliers or manufacturers to help in deciding the type of equipment needed.

The following are manufacturers of equipment suitable for use with U.S.G. texturing products: Binks Mfg. Co., 3114-44 Carroll Ave., Chicago, Ill. 60612; De Vilbiss Co., 1280 W. Washington Blvd., Chicago, Ill. 60607; Glover Mfg. Co., 850 E. Valley Blvd., San Gabriel, Calif. 91776; Grover Mfg. Co., 620 S. Vail St., Montebello, Calif. 90640; Hackel Bros. Inc., 8519 W. Kaul Ave., Milwaukee, Wis. 53225; Quickspray, Inc., Box 327, Port Clinton, Ohio 43452.

wedge block

A tool used to separate gypsum board so that stacks of wallboard can be lifted with a fork truck. Eliminates need for spacers in stacks, thus saving warehouse space.

To make the wedge, laminate maple strips in a block 9½" wide, 30" long and 3½" thick, and taper to a knife edge. Rout a 1"x5" curved notch at the butt end of the wedge and reinforce with a metal plate that is recessed and fastened with four screws. This notch guides the fork of the lift truck when forcing the wedge between sheets of wallboard.

For removing the wedge when stacking board, attach a one-piece, ¾" Y-chain, 11 ft. long, at the thick end of the wedge. Use ¾"x4" lag bolts spaced 2" from the end and centered along the edges. Soak wedge in linseed oil, then sand, wax and polish.

To purchase wedge block, order through Building Supply News, 5 S. Wabash Ave., Chicago, Ill. 60603.



tool holders

Leather Tool Pouch—Holds nine wallboard application tools—big belt loop.★

Leather Nail Bag—Soft leather riveted for long life; round bottom designed so nails won't "pack"; big belt loop.★



appendix a**advisory services for
drywall contractors**

Among the many promotional and business aids that United States Gypsum offers to builders are these on drywall construction planning and procedure. For information on the following services, contact your U.S.G. representative.

How to Read Blueprints—Manual E-153

Bidding for Profits—Manual E-700

Business Management—Workshop Clinic Program

Material Handling—Slide Program

Drywall promotional films for use with customers

appendix b**agency addresses**

- ASHRAE— American Society of Heating, Refrigerating & Air
Conditioning Engineers, Inc.
345 E. 47th St., New York, N.Y. 10017
- ASTM— American Society for Testing & Materials
1916 Race St., Philadelphia, Penna. 19103
- BOCA— Building Officials Conference of America
1313 E. 60th St., Chicago, Ill. 60637
- FHA— Federal Housing Administration
1626 K St. NW., Washington, D.C. 20410
- GSA— General Services Administration
18th & F Sts. NW, Washington, D.C. 20405
- NFPA— National Fire Protection Association
60 Batterymarch St., Boston, Mass. 02109
- UL— Underwriters' Laboratories
207 E. Ohio St., Chicago, Ill. 60611
- GA— Gypsum Association
201 N. Wells St., Chicago, Ill. 60606
- ANSI— American National Standards Institute
1430 Broadway, New York, N.Y. 10018
- ICBO— International Conference of Building Officials
50 S. Robles, Pasadena, Cal. 91101
- A Ins A— American Insurance Association
85 John St., New York, N.Y. 10038
- SBCC— Southern Building Code Congress
1116 Brown-Marx Bldg., Birmingham, Ala. 35203

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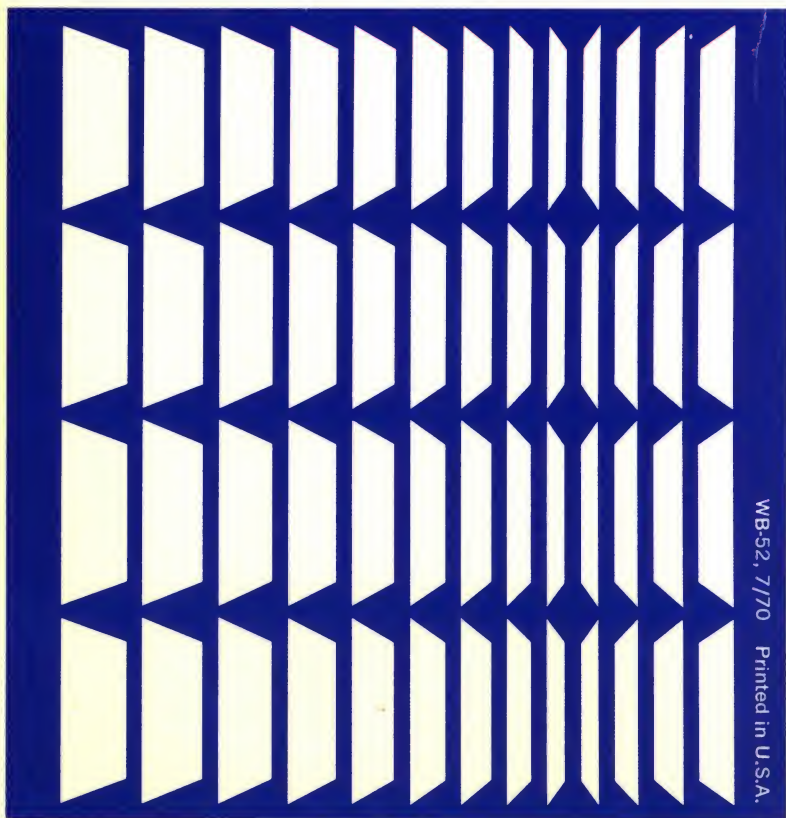


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